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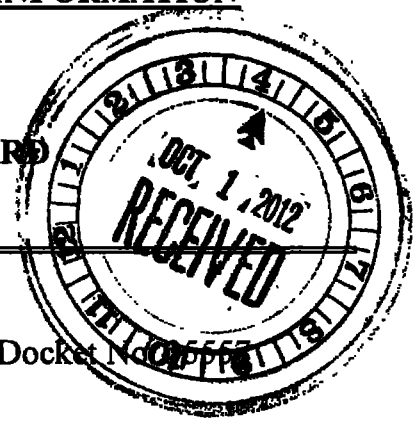
BEFORE THE
SURFACE TRANSPORTATION BOARD



REASONABLENESS OF BNSF RAILWAY COMPANY COAL DUST MITIGATION TARIFF PROVISIONS	)	Finance Docket No. [redacted]

OPENING EVIDENCE AND ARGUMENT OF WESTERN COAL TRAFFIC LEAGUE, AMERICAN PUBLIC POWER ASSOCIATION, EDISON ELECTRIC INSTITUTE AND NATIONAL RURAL ELECTRIC COOPERATIVE ASSOCIATION

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BEFORE THE
SURFACE TRANSPORTATION BOARD

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OPENING EVIDENCE AND ARGUMENT OF WESTERN COAL TRAFFIC LEAGUE, AMERICAN PUBLIC POWER ASSOCIATION, EDISON ELECTRIC INSTITUTE AND NATIONAL RURAL ELECTRIC COOPERATIVE ASSOCIATION

In response to the Surface Transportation Board's ("STB" or "Board") decision served in this proceeding on July 31, 2012, the Western Coal Traffic League ("WCTL"), American Public Power Association ("APPA"), Edison Electric Institute ("EEI") and the National Rural Electric Cooperative Association ("NRECA") (collectively "Coal Shippers") present the following joint opening evidence and argument.

SUMMARY

In Dust I,[1] the Board found that BNSF's publication of the Original Coal Dust Tariff[2] was an unreasonable practice. The Board strongly admonished BNSF

[1] *Ark. Elec. Coop. Corp. – Petition for Declaratory Order*, STB Finance Docket No. 35305 ("Dust I").

[2] "Original Coal Dust Tariff" refers to Item 100, entitled "Coal Dust Mitigation Requirements," initially published on April 30, 2009 in Revision 011 to BNSF's Price List 6041-B and Item 101, entitled "Coal Dust Requirements Black Hills Sub-Division," initially published on May 27, 2009 in Revision 012 to BNSF's Price List 6041-B. The

Railway Company ("BNSF") to work collaboratively with its coal shippers to develop a reasonable alternative.[3] Unfortunately, BNSF failed to heed the Board's advice. As one BNSF manager put it, the "*substance*" of coal dust rules "is not a proper subject of negotiation between railroads and their shippers."[4] BNSF proceeded to ignore shippers and published its Revised Coal Dust Tariff[5] in July of 2011.

BNSF's failure to work with its shippers has led to this proceeding – Dust II. Coal Shippers' opening evidence and argument demonstrates that BNSF's unilateral actions have resulted in its repetition of the errors that led the Board to reject the Original Coal Dust Tariff. Specifically, Coal Shippers demonstrate in this opening submission:

- **The Revised Coal Dust Tariff, like the Original Coal Dust Tariff, is unreasonable because it is rooted in bad science.** Coal shippers presented detailed evidence in Dust I demonstrating that BNSF's Original Coal Dust Tariff was grounded in bad science, including a faulty and arbitrary attempt to measure coal dust emissions from moving coal cars. The Board agreed, stating that it "share[d]" shipper's concerns about

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Original Coal Dust Tariff referred to an "IDV.2" value, which for ease of reference is referred to herein simply as an "IDV" value.

[3] Dust I, STB decision served March 3, 2011 at 14 ("Dust I Decision").

[4] Dust I, BNSF Railway Company's Reply to Western Coal Traffic League's Petition to Reopen and For Injunctive Relief Pending Board-Supervised Mediation, Verified Statement of Stevan B. Bobb ("Bobb V.S.") at 4 (Aug. 23, 2011) ("BNSF Dust I Reop. Reply") (emphasis in original).

[5] "Revised Coal Dust Tariff" refers to Item 100, entitled "Coal Dust Mitigation Requirements," as published on July 14, 2011 in Revision 016 to BNSF's Price List 6041-B, including subsequent revisions to date.

BNSF's coal dust science.[6] BNSF's Revised Coal Dust Tariff is similarly flawed, and must be rejected because it is predicated on faulty and arbitrary testing of coal dust emissions from moving coal cars.

- **The Revised Coal Dust Tariff, like the Original Coal Dust Tariff, is unreasonable because it places all compliance costs on coal shippers.** The Revised Coal Dust Tariff requires shippers to apply expensive surfactants to their coal cars, at a publicly estimated cost of between $50 to $150 million.[7] It is unreasonable for shippers to pay these huge sums because the law places the payment responsibility on BNSF and payment of the charges results in shipper's double paying for the same services. Payment of these additional sums is particularly outrageous because BNSF, and Union Pacific Railroad Company ("UP"), are already earning billions of profits annually on the coal traffic subject to the Revised Coal Dust Tariff.

- **The Revised Coal Dust Tariff, like the Original Coal Dust Tariff, is unreasonable because it contains no enforcement provisions.** In Dust I, shippers emphasized that the Original Coal Dust Tariff contained no enforcement provisions. The Board cited the lack of such provisions in rejecting the Original Coal Dust Tariff.[8] Nevertheless, the Revised Coal Dust Tariff contains no enforcement provisions, a particularly egregious oversight in light of statements reported in the trade press that BNSF may shut down coal trains or impose draconian financial penalties. Coal

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[6] Dust I Decision at 13.

[7] *See* Dust I, Opening Statement of the National Coal Transportation Association ("NCTA") at 6 (March 16, 2010).

[8] Dust I Decision at 14.

transportation, as the Board has repeatedly observed, is vital to national energy security, and that security is too important for BNSF to be permitted to play cat and mouse games with its tariff enforcement.

- **The Revised Coal Dust Tariff, like the Original Coal Dust Tariff permits arbitrary train profile monitoring.** Several years ago, private sector negotiations led to an agreement between Powder River Basin ("PRB") coal shippers, PRB mine operators, and PRB railroads (BNSF and UP): mines would install loading chutes to load trains to meet a streamlined "profile" intended to reduce coal dust emissions from moving coal cars. All PRB mines now employ these chutes. Nevertheless, BNSF proposes to monitor compliance with its profiling requirements at locations that are far from PRB mines. This monitoring procedure produces arbitrary, skewed results, because once a train leaves the mine, train profiles can and do change for causes beyond shipper's control, including wind, train speed, and train vibration.

- **The Revised Coal Dust Tariff, like the Original Coal Dust Tariff, unlawfully limits BNSF's liability.** The Revised Coal Dust Tariff mandates that mine operators spray BNSF-approved surfactants on shippers' cars and then says, as did the Original Coal Dust Tariff, that shippers bear all liability – including liability for BNSF's own negligence – for any spray-related harm to "railroad employees, property, locomotives or owned cars." This attempt at liability shifting is blatantly unlawful. Liability to "railroad employees, property, locomotives or owned cars" is governed by state tort law, or other laws not administered by the STB. BNSF cannot rewrite this law through the publication of a common carrier tariff. It is also particularly arrogant for

BNSF to force shippers to spray their trains, and then try to exempt itself from ensuing liability.

In this opening submission, Coal Shippers present the expert verified statement of Dr. Mark J. Viz ("Viz V.S.") and the expert verified statement of Dr. Ralph W. Barbaro ("Barbaro V.S."). Dr. Viz is one of the nation's leading experts on fugitive dust emissions. Dr. Barbaro is a preeminent authority in matters related to coal production. Coal Shippers also rely on other verified evidence that WCTL tendered in Dust I, including evidence submitted by Paul H. Reistrup, one of the nation's foremost experts on rail operating practices, and Thomas D. Crowley, one of the nation's leading experts on railroad economics.[9]

IDENTITY AND INTEREST

WCTL is an association whose membership is composed of organizations that purchase and transport coal mined west of the Mississippi River. WCTL members transport over 140 million tons of coal annually, nearly all of which moves by rail. Since its formation in 1977, WCTL has actively participated in all major proceedings before the Board and its predecessor, the Interstate Commerce Commission ("ICC" or "Commission"), involving issues of concern to western coal shippers, including Dust I.

APPA is the national service organization representing the interests of over 2,000 municipal and other state- and locally-owned electric utilities in 49 states (all but

[9] The Board extended the protective order in Dust I to permit WCTL and BNSF to tender, in Dust II, confidential and highly confidential information they submitted in their Dust I pleadings. *See* Dust II, STB decision served Jan. 13, 2012 at 2.

Hawaii). Collectively, public power utilities deliver electricity to one of every seven electric consumers (approximately 46 million people), serving some of the nation's largest cities, but also many of its smallest towns. Over 40% of public power utilities generate power from coal.

EEI is the association of U.S. shareholder-owned electric utility companies. EEI's members serve 95 percent of the ultimate customers in the shareholder-owned segment of the industry, and they represent approximately 70 percent of the U.S. electric power industry. EEI's diverse membership includes utilities operating in all regions, including in regions with Regional Transmission Organizations and Independent System Operators, and companies supplying electricity at wholesale in all regions.

NRECA is the national service organization for more than 900 not-for-profit rural electric utilities that provide electric energy to approximately 42 million consumers in 47 states or 13 percent of the nation's population. Kilowatt-hour sales by rural electric cooperatives account for approximately 11 percent of all electric energy sold in the United States. NRECA members generate approximately 50 percent of the electric energy they sell and purchase the remaining 50 percent from non-NRECA members.

The vast majority of NRECA members are not-for profit, consumer-owned cooperatives. NRECA's members also include approximately 65 generation and transmission ("G&T") cooperatives, which generate and transmit power to 668 of the 841 distribution cooperatives. The G&Ts are owned by the distribution cooperatives they serve. Remaining distribution cooperatives receive power directly from other generation

sources within the electric utility sector. Both distribution and G&T cooperatives were formed to provide reliable electric service to their owner-members at the lowest reasonable cost.

Collectively, member companies of WCTL, APPA, EEI and NRECA comprise the vast majority of shippers that purchase, and pay for, the transportation of coal from PRB mines located in the states of Wyoming and Montana.

BACKGROUND

A. BNSF's Original Coal Dust Tariff

Dust I involved the legality of BNSF's Original Coal Dust Tariff. That Tariff called for BNSF's PRB coal shippers to "profile[]" their trains to meet a bread-loaf configuration specified by BNSF and to take steps to "ensure" that these trains would "not emit more than an Integrated Dust Value" ("IDV") of 300 "units" on the Joint Line[10] and 245 "units" on the Black Hills Subdivision. *Id.*

The Tariff further provided that coal shippers were to bear all liability for any "adverse[] impact[s]" to railroad employees or property caused by shipper efforts to comply with the IDV standards through use of train surfactants or other means. *Id.*

[10] The "Joint Line" refers to a line of railroad in the Wyoming PRB that is jointly owned by BNSF and UP. BNSF operates this line and establishes operating rules over the line. *See* Dust I Decision at 2 n.5.

Finally, BNSF published an operating rule that applied the Original Coal Dust Tariff requirements to UP trains moving over the Joint Line.[11]

Under BNSF's convoluted IDV-based tariff scheme, trains moved past "E-Samplers" which recorded emissions in the air.[12] The E-Sampler data was uploaded to a consulting firm in Charlottesville, Virginia, which then used a secret computer program to produce an IDV reading for each train.[13] BNSF asserted this IDV calculation measured "the volume of coal dust coming off the coal train over its entire length."[14]

BNSF also attempted to monitor compliance with its train profiling requirements by lasering trains at locations many miles away from PRB mines to see if the required profile remained intact.[15] The tariff did not contain any enforcement provisions, but BNSF officials were quoted in the trade press as saying that BNSF planned to shut-down trains, or impose penalties of $1.00 per ton (or both), if shippers failed to comply with the IDV and train profiling requirements.[16]

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[11] Dust I, BNSF Railway Company's Opening Evidence and Argument at 26 (March 16, 2010) ("BNSF Dust I Op.").

[12] BNSF Dust I Op., Verified Statement of G. David Emmitt ("Emmitt V.S.") at 8 (Mar. 16, 2010).

[13] Dust I, Opening Evidence and Argument of Western Coal Traffic League and Concerned Captive Coal Shippers, V.S. of Dr. Mark J. Viz at 16 (Mar. 16, 2010) ("WCTL Dust I Op.").

[14] Original Coal Dust Tariff.

[15] Dust I, Rebuttal Evidence and Argument of Western Coal Traffic League and Concerned Captive Coal Shippers at 65 (June 4, 2010) ("WCTL Dust I Reb.").

[16] WCTL Dust I Op. at 49 n.24.

According to BNSF, the purpose of its convoluted IDV-based Original Coal Dust Tariff was to reduce coal dust emissions from the tops of moving coal cars by 85%.[17] BNSF believed this reduction would "substantially eliminate" coal dust in the ballast of the Joint Line and Black Hills Subdivision.[18] BNSF also opined that it was confident, based on IDV readings it had taken on "thousands" of PRB coal trains,[19] that shippers could meet the 85% reduction standard through train profiling, and spraying trains with surfactants – chemicals that are intended to bind coal.[20]

B. The Dust I Proceedings

Arkansas Electric Cooperative Corporation ("AECC") challenged the legality of BNSF's Original Coal Dust Tariff in a declaratory order action filed in October of 2009. In the ensuing proceedings at the STB, WCTL, and other coal shippers, submitted extensive evidence and argument demonstrating that BNSF's publication of the Original Coal Dust Tariff constituted an unreasonable practice.

These submissions proved that BNSF's IDV measurement system was not based on sound science; that there were no proven methods to comply with the IDV standards; that shippers were not legally required to pay for treatment of their trains with expensive surfactants; that the tariff unlawfully failed to state how the IDV standards would be enforced (and what penalties would apply if the standards were not met); that

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[17] BNSF Dust I Op. at 15.

[18] *Id.* at 15.

[19] *Id.* at 6.

[20] *Id.* at 7, 13-14.

BNSF's proposed procedures to monitor compliance with the tariff train profiling monitoring requirements were arbitrary; that BNSF's attempts to insulate itself from all liability for application of surfactants were illegal; and that BNSF lacked the legal authority to compel UP shippers to comply with the tariff requirements.[21]

In its Dust I Decision served on March 3, 2011, the Board found that BNSF's publication of the Original Coal Dust Tariff constituted an unreasonable practice. The Board predicated this finding on three of the arguments raised by WCTL and other coal shippers: the IDV standards were not based on sound science;[22] there was no demonstrated compliance mechanism;[23] and the tariff did not set forth the penalties for non-compliance.[24] Because the Board found that the tariff was unreasonable on these three grounds, the Board determined it was unnecessary to address shippers' additional showings of tariff unreasonableness.[25] The Board proceeded to urge BNSF and its

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[21] *See, e.g.*, WCTL Dust I Op. at 1-55; Reply Evidence and Argument of Western Coal Traffic League and Concerned Captive Coal Shippers at 1-32 (April 30, 2010) ("WCTL Dust I Reply"); WCTL Dust I Reb. at 1-76.

[22] *See* Dust I Decision at 13 ("The Board shares many of the Shipper Interests' concerns regarding the . . . proprietary IDV.2 measurement system.").

[23] *See id.* at 14 ("lacking some sort of safe harbor provision, no shipper can ever be confident that any particular movement it tenders will be in compliance.").

[24] *See id.* at 14 ("the tariff does not explain what consequences coal shippers would face if they are found to have tendered loaded coal cars to the railroad that subsequently released coal dust during transport").

[25] *See id.* at 15 ("there are multiple arguments that the Board does not address given our finding that the tariff is unreasonable").

customers to "collaborate" (*id.* at 14) to develop "cost-effective practices" to address "the coal dust problem."[26]

C. BNSF's Revised Coal Dust Tariff

BNSF ignored the Board's directive. Instead of working cooperatively with its shippers, BNSF unilaterally published its Revised Coal Dust Tariff in July of 2011. The Revised Tariff called for BNSF shippers originating coal from BNSF-served mines in Wyoming and Montana to reduce coal dust emissions from their loaded coal cars "by at least 85 percent" starting on "October 1, 2011." The Revised Coal Dust Tariff further provided that shippers would be "deemed to be in compliance" with the 85% reduction standard if they met train profiling requirements and properly applied a BNSF-approved surfactant or other form of BNSF-approved dust suppression.

BNSF listed three approved surfactants in the appendix to the Revised Coal Dust Tariff.[27] BNSF said that it had approved these surfactants based on the results of "recent tests carried out in the PRB."[28] The Revised Coal Dust Tariff also required, as did the Original Coal Dust Tariff, that shippers guarantee that application of BNSF approved surfactants "shall not adversely impact railroad employees, property, locomotives or owned cars."[29] The full text of the Revised Coal Dust Tariff is set forth in

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[26] *See id.* at 5.

[27] *Id.* BNSF subsequently added two additional approved surfactants in Revision 18, and a third in Revision 20, to the Revised Coal Dust Tariff.

[28] *Id.*

[29] *Id.*

Counsel's Exhibit 1. Finally, BNSF issued a new Joint Line operating rule that required UP to comply with the terms of the Revised Coal Dust Tariff.[30]

In apparent response, UP published two new tariff rules. The first tariff rule "recommend[s]" that UP shippers purchasing PRB coal under contracts "issued on or prior to September 30, 2011" comply with the standards set forth in BNSF's Revised Coal Dust Tariff.[31] The second tariff rule "require[s]" that UP shippers purchasing PRB coal under contracts "issued after September 30, 2011" or under common carrier tariffs "effective October 1, 2011," comply with the standards set forth in BNSF's Revised Coal Dust Tariff.[32] The full text of these two UP tariff items, and their recent updates, is set forth in Counsel's Exhibit 2.

D. The Dust II Proceedings

On August 12, 2011, WCTL filed a petition asking the Board to reopen the Dust I case and to enjoin the application of the Revised Coal Dust Tariff pending the completion of a Board-supervised mediation.[33] WCTL took this action because BNSF had not adhered to the Board's admonition to work collaboratively with its shippers to develop reasonable coal dust practices, and, as a direct result, BNSF's Revised Coal Dust Tariff continued to be unreasonable because it was not based on sound science, it required shippers to bear all compliance costs, it failed to contain enforcement provisions,

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[30] *See* BNSF Dust I Reop. Reply, Bobb V.S. at 8.

[31] UP Circular 6603-C, Item 215 (effective Sept. 30, 2011).

[32] UP Circular 6603-C, Item 216 (effective Sept. 30, 2011).

[33] *See* Dust I, Petition to Reopen and For Injunctive Relief Pending Board-Supervised Mediation (Aug. 11, 2011) ("WCTL Dust I Reop. Pet.").

it called for arbitrary monitoring of train profiling, and it attempted to insulate BNSF from liability. *Id.* at 7-8.

WCTL's petition was supported by all major coal shipper groups,[34] but opposed by BNSF and UP.[35] In its opposition filing BNSF made clear that in its view, collaboration was a one-way street. As one of BNSF's Vice Presidents put it, "the *substance* of operating rules is not a proper subject of negotiation between railroads and their shippers."[36] BNSF also argued that a stay of the Revised Coal Dust Tariff was unnecessary because BNSF would not enforce the Revised Tariff without giving affected shippers sixty days advance notice.[37]

The Board addressed WCTL's request for a stay in its decision served on August 31, 2011. The Board found that WCTL's request for a stay was effectively moot in light of BNSF's representations that it would not enforce the Revised Tariff. *See id.* at 3 ("shippers face[] no current possibility of a sanction for noncompliance"). The Board addressed WCTL's request to reopen, and for mediation, in its decision served on Nov 22, 2011.

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[34] *See* Dust I, letter filed Aug. 23, 2011 (APPA, EEI and NRECA support WCTL's petition); letter filed Aug. 24, 2011 (NCTA supports WCTL's petition); letter filed Aug. 22, 2011 (CURE supports WCTL petition). AECC also filed a pleading supporting WCTL's petition on August 19, 2011.

[35] *See* BNSF's Dust I Reop. Reply at 1; Union Pacific Railroad Company's Reply to the Western Coal Traffic League's Petition to Reopen and for Injunctive Relief Pending Board-Supervised Mediation at 1 (Aug. 26, 2011).

[36] BNSF Dust I Reop. Reply, Bobb V.S. at 4.

[37] *Id.* at 7.

In this second decision, the Board concluded that the most effective way to address the issues raised in WCTL's petition was not to reopen Dust I, and mediate, but instead to institute a new proceeding.[38] As the Board explained, "[t]he new proceeding will allow parties to address issues raised by WCTL that are related to the reasonableness of the safe harbor provision, such as the absence of penalties for noncompliance, the lack of cost sharing, and shipper liability associated with the use of BNSF-approved topper agents."[39]

In the ensuing Dust II proceedings, the Board has entered a protective order;[40] modified the protective order it entered in Dust I to permit, *inter alia*, WCTL to utilize its confidential/highly confidential Dust I pleadings in Dust II;[41] resolved various discovery disputes;[42] and approved a procedural schedule permitting parties of record to submit three rounds of evidence and argument.[43]

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[38] Dust II, STB decision served Nov. 22, 2011 at 4.

[39] *Id.* at 4 n.5. The Board later clarified that the issues that could be raised in this case were "not limited to" those it cited in this list. *See* Dust II, STB decision served March 19, 2012 at 1.

[40] *Id.*, Dust II, STB decisions served Jan. 13, 2012 and April 23, 2012,

[41] *Id.*

[42] *Id.*, Dust II, STB decisions served March 5, 2012, March 19, 2012, April 30, 2012 and June 25, 2012 (affirming Dust II Decision served Feb. 27, 2012).

[43] *Id.*, Dust II, STB decision served Dec. 16, 2011, as modified, Dust II, STB decisions served Feb. 27, 2012 and July 31, 2012.

ARGUMENT

The Revised Coal Dust Tariff appears to be BNSF's answer to the Board's Dust I Decision. However, the Board made it very clear in this decision that it "expect[ed] that railroads and their customers will collaborate" to "develop reasonable solutions to the problems presented in this case." Dust I Decision at 14. BNSF ignored the Board's directive. By pursuing unilateral action BNSF failed to adhere to the Board's Dust I Decision, and the resulting Revised Coal Dust Tariff continues to be unreasonable.

I.

THE REVISED COAL DUST TARIFF IS UNREASONABLE BECAUSE IT IS BASED ON JUNK SCIENCE

Coal Shippers demonstrated in Dust I that the coal dust mitigation standards in the Original Coal Dust Tariff were predicated on junk science, and that publication of a tariff based on junk science was an unreasonable practice. The Board agreed. BNSF has made the same mistake again. The coal dust mitigation standards in the Revised Coal Dust Tariff are based on junk science, and publication of a tariff based on this junk science is an unreasonable practice.[44]

[44] *See* Dust I, Reply Comments of the U.S. Department of Transportation at 1 ("DOT Dust I Reply") (to obtain regulatory approval, the "tariff rule at issue must be reasonable, which means that the Board must be satisfied that the methodology on which it is based is sound").

A. The Board Rejected BNSF's Original Tariff Due to the Many Flaws in BNSF's Emission Monitoring and Emission Testing

BNSF's Original Cost Dust Tariff's IDV methodology was developed in secret by BNSF with no meaningful input by rail shippers concerning the associated "science" behind the methodology. BNSF's closed-door policy left shippers with no alternative other than to challenge the Original Coal Dust Tariff in proceedings before this Board, and then use the Board's discovery processes to try to obtain the material necessary to understand and fairly evaluate BNSF's IDV "science."

Once BNSF's closed door was pried open in the Dust I proceedings, it was easy to see why BNSF did not want to let shippers see the innards of its IDV calculations. WCTL and other coal shippers demonstrated that BNSF's IDV-based approach to dust monitoring was fatally flawed in numerous respects: the E-Samplers BNSF relied on to collect dust from coal trains were not isolating coal dust; the E-Samplers produced wildly different readings in "side-by-side" testing; the E-Sampler filters were not being used, in contravention of the manufacturer's instructions; the IDV values purportedly being calculated using the E-Sampler results were the product of some unproduced computer program; and to the extent the program mechanics could be deciphered, they appeared to have significant statistical flaws.[45] In short, coal shippers demonstrated that BNSF's IDV-based system was based on garbage in/garbage out, rendering the IDV results unreliable, and a tariff based on them unreasonable.

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[45] *See, e.g.*, WCTL Dust I Op. at 25-33; WCTL Dust I Reply at 17-19; WCTL Dust I Reb. at 30, 50.

In its Dust I Decision, the STB agreed with the coal shippers' demonstration:

> The Board is . . . concerned with technical aspects of BNSF's monitoring system and emission standards. The Shipper Interests claim that the monitoring system produces variable and unreliable results. For example, the Shipper Interests contend that the monitoring system does not account for the fact that dust dispersion is sporadic because of factors like wind speed, and they emphasize that when BNSF placed two E-Samplers next to each other for testing, one monitor had 31% higher readings than the other . . . .
>
> The Shipper Interests also claim that the monitors do not measure coal dust deposited on the tracks; instead, the monitors measure a variety of particles in the air many feet from the tracks. . . .
>
> The Shipper Interests assert that BNSF violated Board rules of practice when it did not provide the computer program it uses to convert the E-Sampler data into IDV.2 values, and that the "detailed logic and assumptions" that BNSF states it provided are insufficient for a full analysis. The Shipper Interests contend that the statistical analysis BNSF used to develop the IDV.2 standards is flawed and that BNSF was unable to find a third party to validate the methodology. . . .
>
> The Board shares many of the Shipper Interests' concerns regarding the methods of effective compliance and the proprietary IDV.2 measurement system. . . .
>
> . . . . [T]he railroad's trackside coal dust emission monitoring system raises additional questions. Shippers have raised legitimate concerns about their lack of access to equipment testing and other technical data before being asked to accept the equipment's measurements and the subsequent liability that would be triggered by those measurements.

Id. at 12-14 (footnotes omitted).[46]

B. BNSF's Dust II Tariff is Similarly Flawed

BNSF's Revised Coal Dust Tariff's "safe harbor" reflects the same closed-door/junk science approach. BNSF claims that "recent tests carried out in the PRB" demonstrate that three topper sprays, if properly applied and used in conjunction with train profiling, will reduce coal train emissions by 85%. *Id.* The "tests" BNSF is referring to are the so-called "Super Trial" tests BNSF conducted in 2010.[47]

The purpose of BNSF's Super Trial was to identify dust suppression sprays that, when applied to shippers' profiled trains, would meet BNSF's minimum IDV values.[48] 1,633 treated trains were tested, with IDV values calculated for 1,518 trains. BNSF claimed that the test results showed that different topically applied sprays produced different IDV values, but all produced dust reductions when compared to unsprayed trains.[49] The testing on these 1,518 trains must be thrown out for the same reasons the STB rejected the Original Coal Dust Tariff – BNSF's attempt to calculate train IDV does not produce reliable estimates of actual coal dust emissions.

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[46] BNSF has now abandoned its IDV monitoring system for regulatory use. *See* BNSF Railway Company's Responses and Objections to Coal Shippers' First Set of Interrogatories and Document Requests at 11 (Jan. 9. 2012) ("BNSF Dust II Discovery Responses") ("BNSF states that it does not intend to use . . . E-Samplers to determine compliance with [the Revised Coal Dust Tariff]").

[47] *See* BNSF Dust I Reop. Reply at 9.

[48] *See* WCTL Dust I Reop. Pet., Verified Statement of Duane L. Richards ("Richards V.S."), Attachment 7 at 1.

[49] *Id.*, Attachment 8 at 2.

The remaining 115 trains – only 7% of the total trains tested – were composed of trains where one-half of the cars on a train were treated with a particular topper or full body spray and one-half of the cars on the same train were untreated. *Id.* at 1. BNSF placed passive collectors on a few treated and untreated cars in each train, collected particulate samples, and purported to process the results in a manner that identified the percent reduction in coal dust emissions between the sprayed and unsprayed particulate samples. *Id.*

WCTL asked Dr. Viz to review BNSF's passive collector study. He found that this study suffers from many of the same types of flaws that led the Board to reject BNSF's IDV study results, as well as additional new flaws:

- Dust sprays were designed for use in "static coal stockpiles at coal-burning power plants." Viz V.S. at 3. Sprays can "work when applied to a large pile of coal *that is stationary*, but there are still many aspects of their performance *in moving railcars* that have not yet been verified." *Id.* Indeed, in some instances, spraying can lead to increased dust emissions. *Id.*

- BNSF's 115 train size sample, as well as the much smaller sample sizes used to evaluate individual surfactants, were too small to "make any statistically significant inferences" concerning the effectiveness of broad-scale train spraying. *Id.* at 22-23.

- BNSF has failed to provide explanations or documents in discovery that explain key aspects of its passive collector measurements. *Id.* at 8-14, 16-20, 23.

- To the extent that Coal Shippers can decipher BNSF's passive collector measurements, it is clear that BNSF: {

}

- BNSF's passive collector testing was set up and supervised by the same consultants that produced the thoroughly discredited IDV measurement system, {

}

Based upon these, and other, "fundamental flaw[s]"[50] identified by Dr. Viz in BNSF's passive collector procedures, BNSF's passive collector study results, like its IDV results, do not provide a reasonable measure of actual coal dust emissions from any train, and certainly "cannot be used to scientifically establish the amount, if any, of fugitive particulate emissions from railcars with certainty, reliability or repeatability, nor can they be used to scientifically establish the quantitative effectiveness (in terms of percent reduction in dust emissions), if any, of the application of coal dust suppressants." *Id.* at 3.

C. BNSF's Use of a "Safe Harbor" Does Not Excuse its Failed Science

BNSF argues that even if its measurement of coal dust emissions produces wildly inaccurate measurements of coal dust, this result is of no practical consequence because "BNSF's coal dust rule gives shippers a safe harbor if they choose to use specific

[50] *Id.* at 7.

topper agents."[51] Of course, the existence of a "safe harbor" does not make the Revised Coal Dust Tariff reasonable.[52] Where, as here, the tariff is premised on studies of coal dust emissions that are fundamentally flawed, the tariff itself must be rejected. Shippers (or carriers) should not be required to expend millions to comply with a tariff that is not based on sound science.

The Department of Transportation ("DOT") reached the same conclusion in Dust I. DOT emphasized that any dust containment tariff must be based on a "sound" methodology for measuring coal dust emissions that has a "well-grounded scientific basis":

> [a]s a legal matter . . . the Board must be satisfied that BNSF's methodology and results are sound. In other words, that collection, measurement, and analysis of coal dust, as well as translation of these data into quantitative limits, all have a well-grounded scientific basis such that they accurately capture the extent of the emissions and effectively redress their impact. . . BNSF's emission limits would be unreasonable if they were based upon faulty collection, measurement, or analysis of coal dust emissions, or if they required steps that would not redress the problem.

DOT Dust I Reply at 6.

In the absence of any sound testing of coal dust emissions from moving coal cars, no valid conclusions can be drawn as to whether any percentage dust reduction

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[51] BNSF Dust I Reop. Reply, Emmitt V.S. at 2. This position is inconsistent with the one taken by BNSF earlier in Dust I. *See* BNSF Dust I Op., Verified Statement of William VanHook ("VanHook V.S.") at 5 (coal dust mitigation should be "based on a solid factual and scientific basis").

[52] The Board itself has held that issues "relat[ing] to [BNSF's safe harbor] testing and performance of chemical agents for controlling coal dust" are "central to the subject matter of this proceeding." Dust II, STB decision served March 5, 2012 at 3.

target (be it 100%, 85%, 60% etc.) is achievable. Nor is it possible to determine the effectiveness of any proposed compliance mechanisms or perform any meaningful balancing of costs and benefits. *See* DOT Dust I Reply at 7 ("sound public policy militates in favor of resolving the problems posed by coal dust emissions in the most cost-effective way"); Dust I Decision at 5 ("a tariff should employ cost-effective practices").

BNSF does not care about flawed testing, etc., because it simply wants to force shippers to apply expensive surfactants. While BNSF may not care, shippers do, and the Board cannot approve an emissions-based tariff where, as here, the science underlying the emissions standards is fundamentally flawed.

D. Shippers Are Employing Cost-Effective Containment Practices

BNSF argues that Coal Shippers are not interested in seeking cost-effective solutions to coal dust mitigation.[53] However, that is not the case. All PRB coal shippers are profiling their trains, and most are replacing 2 inch coal with larger 3 inch coal. *See* Barbaro V.S. at 2-3.

BNSF's own studies of {

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[53] *See* BNSF Dust I Reop. Reply at 1-3, 10-14.

[54] *See* BNSF Dust I Op., VanHook V.S., Exhibit 5 at 65.

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} valid testing may well show that a combination of profiling, use of larger coals, and appropriate maintenance, are a reasonable, cost-effective containment strategy. *See* Dust I Decision at 6 ("any tariff provision must be reasonably commensurate economically with the problem it addresses").

Coal Shippers note that BNSF's 85% reduction standard is one that BNSF conjured up based on the results of its thoroughly discredited IDV studies,[58] and one that BNSF has no incentive to modify since it is placing all compliance costs on coal shippers. BNSF would no doubt be taking a much closer look at its 85% reduction target, and the cost-effectiveness of spraying versus less expensive containment strategies, if it was footing the bill.

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[55] *See id.* at 68

[56] *See id.* at 74, 76.

[57] *See* WCTL Dust I Op. at 23 (citing BNSF_COALDUST_0038717-38731, at 38726).

[58] *See* BNSF Dust I Op. at 14-15.

II.

THE REVISED COAL DUST TARIFF IS UNREASONABLE BECAUSE IT REQUIRES SHIPPERS TO BEAR ALL COMPLIANCE COSTS

BNSF's Revised Coal Dust Tariff, like the Original Coal Dust Tariff, requires that coal shippers bear all costs to comply with the tariff. The only BNSF-approved compliance option to date is profiling plus surfactant spraying, so compliance with the Revised Coal Dust Tariff terms requires that shippers pay to spray trains.

Spraying coal trains with surfactants is expensive. As noted above, the National Coal Transportation Association has estimated these costs in the $50 to $150 million range annually.[59] It is unreasonable for BNSF to unilaterally impose these costs on their coal shippers because: (1) the law places responsibility for spraying costs on BNSF; (2) the law precludes BNSF from requiring shippers to pay twice for the same service; and (3) it is fundamentally unfair for BNSF to reap all of the benefits (if any) from spraying, while incurring none of the costs; and (4) requiring shippers to pay to spray trains is contrary to current industry practice.

A. The Law Requires BNSF to Incur All Reasonable Spraying Costs

Governing law is clear here. The law requires whoever is supplying rail cars – be it the shipper or the railroad – supply a car that is properly loaded to permit safe

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transportation of freight.[60] The law also requires that the party (be it the shipper or the railroad) that seeks special car treatment or service – *i.e.*, service or treatment in addition to that needed for safe transportation of a shipper's freight in accordance with the shipper's instructions – bear the additional costs attributable to the special service.[61] Application of these basic principles here shows that BNSF is responsible for paying for any BNSF-mandated spraying of coal cars.

First, there is no question that coal can be carried safely in open-top coal cars without the application of surfactants. For over the past 100+ years coal has moved safely in open top cars without application of surfactants, and most coal transported today continues to move safely without application of surfactants. Application of surfactants is not a railcar safety issue, but instead a rail line maintenance-of-way issue.

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[60] *See, e.g.*, 49 U.S.C. § 11706 (making common carriers by rail generally responsible for the safe transportation of the commodities they carry); *Waste Material Dealers Ass'n of Ark. v. Chicago, Rock Island & Pac. Ry.*, 226 I.C.C. 683, 688 (1938) ("It is the right and duty of the railroads to refuse to accept shipments that are not loaded in a safe manner."); *Consignees' Obligation to Unload Rail Cars in Compliance with Carriers' Published Tariffs*, 340 I.C.C. 405, 410 (1972) ("carriers may refuse for shipment articles tendered for transportation, unless in such condition and so prepared for shipment as to render the transportation thereof reasonably safe and practicable").

[61] *See, e.g., Furnishing Suitable Cars For Loading Flour and Other Grain Products*, 128 I.C.C. 442, 444 (1927) ("It is well settled that a common carrier must furnish suitable equipment for safe transportation, and that special safeguards desired by the shipper should be furnished by him."); *Baltimore & Ohio R.R. v. United States*, 391 F. Supp. 249, 257 (E.D. Pa. 1975) ("it is inequitable to require shippers to pay additional charges for cars of different dimensions or capacity from those which would suit their needs"); *Radioactive Materials, Special Train Serv., Nationwide*, 359 I.C.C. 70, 91 (1978) ("[h]istorically special train service has been a privilege accorded the shipper, rather than any requirement imposed on a shipper").

The agency charged with regulating rail safety is the Federal Railroad Administration ("FRA") agrees. The FRA has promulgated many rules governing the safe operation of all railcars, including railcars used in coal service. The FRA has never deemed application of surfactants necessary for the safe transportation of coal, a position reaffirmed by the DOT in Dust I.

DOT explained in Dust I that coal cars could be safely transported with, or without, application of surfactants, so the issue before the Board was not one involving the safe loading of rail cars.[62] Instead, DOT said Dust I raised issues concerning proper ballast maintenance. *See id.* at 3 ("the [FRA] rules most germane to this proceeding are those governing ballast"). As described by DOT, FRA has adopted comprehensive standards governing ballast performance; directed railroads to comply with these standards; but left the specific steps for doing so with the railroads in the first instance rather than prescribing these steps:

> FRA has adopted comprehensive regulations that prescribe minimum track safety standards. 49 C.F.R. Part 213. Some provisions, like those on track structure, impose numerous detailed requirements for many physical aspects of railroad track . . . By contrast, the rules most germane to this proceeding are those governing ballast, and they are not prescriptive but performance-based:
>
> **Ballast; general.**
>
> Unless it is otherwise structurally supported, all track shall be supported by material which will—
> (a) Transmit and distribute the load of the track and railroad rolling equipment to the subgrade;

[62] *See* DOT Dust I Reply at 4.

> (b) Restrain the track laterally, longitudinally, and vertically under dynamic loads imposed by railroad rolling equipment and thermal stress exerted by the rails;
>
> (c) Provide adequate drainage for the track; and
>
> (d) Maintain proper track crosslevel, surface, and alignment.

49 C.F.R. § 213.103; *see also* 49 C.F.R. § 213.334.

> Ballast, then, must distribute loads while simultaneously maintaining specific track geometry metrics and providing adequate drainage. It can only perform these functions if it is at once strong, stable, and porous. FRA standards are performance-based because ballast must meet these needs in a variety of circumstances that defy uniformity. Accordingly, FRA does not prescribe the type of ballast or the amount of ballast that a track owner must use; compliance is determined by whether the ballast performs the functions that it is required to perform with respect to each specific segment of track.

Id. at 3-4 (footnotes omitted).

DOT went on to advise that BNSF could comply with FRA ballast requirements "in a variety of ways" including "via maintenance of way":

> Properly understood, FRA regulations require BNSF to ensure that the ballast of the PRB Joint Line track performs the functions specified. BNSF may do so in a variety of ways, as long as its choices do not themselves violate applicable regulations or otherwise threaten safety. None of the alternatives reflected in the record of this proceeding, whether undertaken by railroads (via maintenance of way) or coal shippers (by profile loading, spraying surfactant, etc.) do so.

Id. at 4.

Second, in this case, the party that is seeking to impose special treatment of safely loaded coal cars is BNSF, not its coal shippers. That treatment consists of

spraying coal cars, or application of any other BNSF-approved method. In either case, the Revised Coal Dust Tariff calls for the shipper, not BNSF, to pay for the special treatment. The costs associated with this special treatment must be borne by BNSF, the party seeking the special treatment.

B. The Law Precludes BNSF from Requiring Shippers to Pay Twice For the Same Service

The stated purpose of BNSF's Revised Coal Dust Tariff is to reduce the amount of coal dust that enters track ballast.[63] The law requires that BNSF – as a track owner – to properly maintain this ballast[64] and BNSF can collect payment from its shippers for providing this service. The same legal standards apply to UP.[65] However, the law does not permit BNSF or UP to force shippers to pay twice for the same maintenance service.[66] But that is exactly what they propose.

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[63] *See* Revised Coal Dust Tariff (tariff rules intended "[t]o prevent contamination of the rail ballast"); Dust I Decision at 8 (coal dust raises "issues associated with maintenance").

[64] *See, e.g., R.R. Ventures, Inc. – Abandonment Exemption – Between Youngstown Ohio, & Darlington, Pa. In Mahong & Columbiana Cntys., Ohio, & Beaver Cnty., Pa.*, STB Docket No. AB-556 (Sub-2X) (STB served April 28, 2008) at 10 ("a common carrier [has] a duty to maintain its rail line in accordance with [governing] rules and regulations"); DOT Dust I Reply at 5 ("maintenance of way is a basic railroad responsibility").

[65] As discussed above, the Revised Coal Dust Tariff standards apply to UP trains, and BNSF and UP share ownership of the Joint Line.

[66] *See, e.g., Indiana Harbor Belt R.R. v. Gen. Am. Transp. Corp.*, 577 F.2d 394, 400 (7th Cir. 1978) (requiring shippers to pay twice for the same switching service is an unreasonable practice); *Rail Fuel Surcharges*, STB Ex Parte No. 661, at 10-11 (STB served Jan. 26, 2007) (requiring shippers to pay twice for the same fuel cost increase is an unreasonable practice).

BNSF stipulated in Dust I that it sets rates to cover all of its costs, including its maintenance costs:

> BNSF attempts generally to cover its variable costs, which would include maintenance costs relating to ballast cleaning, undercutting and shoulder cleaning, and to generate contribution that will assist in covering fixed costs.

WCTL Dust I Op., Verified Statement of Thomas D. Crowley ("Crowley V.S."), Exhibit TDC-2 at 1 (Letter from BNSF Counsel to WCTL Counsel (Feb. 26, 2010)).

Moreover, the rates BNSF and UP actually charge PRB shippers permit them to recover all of their PRB maintenance costs plus huge profits. BNSF's CEO has singled out BNSF's coal traffic as "the most profitable commodity we haul"[67] and, since 2003, rates BNSF and UP have charged on their PRB coal traffic have skyrocketed, generating billions in contribution and profits.[68]

PRB coal shippers are already paying rates that cover all of BNSF's, and UP's, PRB track maintenance costs. Requiring them to pay an additional $50 to $150 million annually to maintain PRB ballast – when they are already reimbursing the carriers for all ballast maintenance costs in their freight rates – is clearly an unreasonable practice.

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[67] *Matt Rose Meets with Workforce at Town Hall*, Powder River Reflection, Sept./Oct. 2003 at 6.

[68] *See Competition in the R.R. Indus.*, STB Ex Parte No. 705, Comments of the Western Coal Traffic League, Richards V.S. at 18-19 (April 12, 2011); WCTL Dust I Reply, Crowley V.S. at 5-7.

C. It is Fundamentally Unfair for Shippers to Pay More While BNSF Pays Less

Under the Revised Coal Dust Tariff, shippers will pay more because they have to pay to spray their trains. On the other hand, BNSF concludes that it will incur substantially lower maintenance expense if shippers spray their trains.[69] Thus, under BNSF's proposal, shippers pay more and BNSF pays less. This result is a fundamentally unfair practice because shippers bear all the compliance costs, while BNSF obtains all the compliance benefits.[70]

BNSF argued in Dust I that it was fair for shippers to pay more, and BNSF pay less, because all shippers, other than coal shippers, are required to keep their freight in their cars.[71] BNSF's assertions are both misdirected and wrong. They are misdirected because most loading rules are directed at securing freight so it can be safely transported. Coal of course can be safely loaded and transported with or without spraying.[72]

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[69] BNSF Dust I Reply, Van Hook V.S. at 25. {

}; *see also Major Issues in Rail Rate Cases*, STB Ex Parte No. 657 (Sub-No. 1) (STB served Oct. 30, 2006) at 43 ("[C]oal dust fouling a railroad's right-of-way is a source of maintenance expenses for railroads. Railroads and coal shippers are exploring ways to reduce the amount of coal dust lost in transit, such as altering the shape of car loads or spraying agents on the coal, thereby reducing the amounts necessary to be spent on maintenance.") (footnotes omitted).

[70] *See Kansas City Power and Light Co. v. Kansas City Southern Ry.*, 361 I.C.C. 848, 851 (1979) (finding carrier practice unreasonable where the practice was "fundamentally unfair" and resulted in a "windfall" for the carrier).

[71] *See* BNSF Dust I Op. at 5.

[72] *See* DOT Dust I Reply at 4.

They are wrong because most coal today moves without first being sprayed, as do other commodities that are transported in open top cars. As explained by Paul H. Reistrup, one of the nation's foremost authorities on railroad operations:

> During my many years of direct railroad operating experience and management, including overseeing all car operations for Illinois Central, I personally observed a variety of products that escape open top rail cars in addition to coal and coal dust, including wood chips, iron ore pellets, ballast, ballast dust, sand, gravel, crushed rock, crushed rock dust, other aggregates, and construction and demolition debris. Such occurrences were a regular part of operating the railroads I worked for and no special maintenance charges were assessed due to the escaped material.

WCTL Dust I Reb., Verified Statement of Paul H. Reistrup at 2.

Moreover, the amount of dust, if any, that may be emitted from the top of a loaded coal train turns on three principal factors: how the train is loaded, how it is operated, and the weather (including wind and rain).[73] Coal shippers have limited control over how their trains are loaded, and have no control whatsoever over how railroads operate those trains, or the weather. They should not have to bear all responsibility for actions that are, and always will be, beyond their control.

The equitable solution here is the same as the legal one. PRB coal shippers are already paying their full and fair share of BNSF's (and UP's) maintenance costs in their line haul rates. If BNSF (and UP) are going to require shippers to spray their trains, a reasonable and fair cost sharing approach is for BNSF and UP to reimburse shippers for

[73] *See* BNSF Dust I Op., VanHook V.S., Exhibit 5 at 29 ("[w]ind speed and train speed are two of the dominate factors controlling trains' dust emission"); Viz V.S. at 34-36.

the expenses they incur in complying with BNSF's spraying requirements, as those expenses – at least as BNSF and UP see it – should reduce substantially the maintenance costs that shippers are already paying.

Nothing in the Board's Dust I Decision compels a different answer. The Board held in Dust I that BNSF could adopt a "reasonable" loading rule directed at containing coal dust emissions in its ballast.[74] The important word is "reasonable" and what is reasonable and fair here is for BNSF (and UP) to reimburse their shippers for any reasonable costs they incur to comply with a reasonable loading rule directed at coal dust mitigation (should BNSF or UP ever promulgate such a rule).

D. Requiring Shippers to Pay a Separate Charge for Coal Dust Mitigation is Contrary to Industry Practice

In Dust I, BNSF pointed out that some Norfolk Southern Railway Company ("NS") trains, as well as some trains moved by railroads operating in foreign countries, were being sprayed with chemical surfactants.[75] However, BNSF pointed to no instances where NS, or a foreign carrier, was requiring shippers to enter into separate arrangements with coal suppliers to pay for the application of surfactants, and Coal Shippers are not aware of any such arrangements. Requiring shippers to enter into such arrangements is contrary to industry practice.

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[74] Dust I Decision at 11.

[75] *See* BNSF Dust I Op., Emmitt V.S. at 13.

} *See* WCTL Dust I Op. at 36. As WCTL/CCCS correctly concluded in Dust I, {

} *Id.* at 36-37.

E. Fair Cost Sharing Requires BNSF to Reimburse Shippers for Their Reasonably Incurred Compliance Costs

BNSF could establish a fair cost sharing arrangement in a reasonable containment-based coal dust tariff by including a provision stating that it will reimburse shippers' reasonably incurred compliance costs or by including a provision containing a reasonable reimbursement at a specified per ton allowance. The choice is BNSF's in the first instance. UP could then follow suit. The absence of any such provisions, on the facts of this case, is an unreasonable practice.

III.

THE REVISED COAL DUST TARIFF IS UNREASONABLE BECAUSE IT CONTAINS NO ENFORCEMENT PROVISIONS

The Revised Coal Dust Tariff, like the Original Coal Dust Tariff, is unreasonable and unlawful because it does not inform shippers of the consequences of a shipper's failure to adhere to the tariff terms. BNSF's failure to include any enforcement provisions in the Original Coal Dust Tariff was one of the factors that led the Board to

find that the Original Coal Dust Tariff was unreasonable. *See* Dust I Decision at 14 ("the [Original Coal Dust] tariff does not explain what consequences coal shippers would face if they are found to have tendered loaded coal cars to the railroad that subsequently released dust during transport"). BNSF continues to ignore the Board's – and Coal Shippers' – concerns.

Most tariffs contain performance standards that explain the consequences of non-compliance. For example, tariffs will contain provisions establishing loading and unloading "free time," and then set forth the penalties that apply if a shipper fails to load or unload its trains during the "free time" allowed.[76] Similarly, tariffs will contain provisions governing payment of bills for services rendered, and then set forth penalties that apply if a shipper fails to pay its bills on time.[77] Tariffs are structured in this way so that carriers comply with governing law requiring that all pertinent transportation terms be clearly set forth in the tariff text.[78]

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[76] *See, e.g.*, BNSF Price List 6041-B, Revision 20, Item 110 (establishing four hour free time for loading, and six hour free time for unloading, of PRB coal trains, and establishing a $600 per hour detention charge if trains are not loaded or unloaded during the specified free time).

[77] *See, e.g.*, BNSF Rules Book 6100-A, Revision 109, Item 3400G (establishing, *inter alia*, 15 day time period pay freight charges and setting forth finance charge of 0.033% per day for late payments).

[78] *See, e.g., Birmingham Rail & Locomotive Co., Inc. v. Aberdeen & Rockfish R.R.*, 358 I.C.C. 606, 608 (1978) (tariff must contain "clear standards for application" and all governing rates, rules and policies "should be specifically defined as well as published"); *Radioactive Materials*, 359 I.C.C. at 73 (railroads must "plainly state their tariffs [] in order to inform all parties of their plain meaning and to avoid controversy") (internal quotation marks omitted).

The Revised Coal Dust Tariff contains many performance standards. Shippers are required to apply BNSF approved surfactants (or any other BNSF-approved dust mitigation method); shippers are required to "properly appl[y]" these approved surfactants; and shippers are required to "ensure" that trains meet BNSF's profiling requirements. *Id.* However, the Revised Coal Dust Tariff does not specify the consequences of a shipper's failure to comply with these standards.[79]

BNSF's failure to specify the consequences of non-compliance is particularly egregious in light of public reports that BNSF may shut down a shipper's trains, or impose draconian financial penalties, for claimed non-performance. *See UP Letter Mulls Implications of Coal Dust Rules*, Platt's Coal Trader, Oct. 19, 2009 ("A top BNSF official told utility customers this month that penalties for not meeting dust standards include a $1 per ton fine and possibly temporarily halting service.").

"Possibly temporarily halting train service" (*id.*) can be devastating to utilities that depend on coal as a utility boiler fuel and subverts national energy policy "[d]ue to the vital role transportation of coal by rail plays in the nation's energy supply and the economy in general." Dust I, STB decision served Dec. 11, 2009 at 1. Similarly, imposing a $1 per ton fine would produce huge fines approximating $17,000 per train for many trains.

[79] BNSF also has informed Coal Shippers that "no formal non-privileged consideration has been given to the implementation of specific enforcement measures" against BNSF or UP shippers for their failure to comply with the Revised Coal Dust Tariff standards. *See* BNSF Dust II Discovery Responses at 5, 7.

The law does not permit BNSF to play cat and mouse with tariff enforcement procedures. Nor is it sound public policy for shippers, and the Board, to be forced to guess what BNSF's enforcement policies may be based on trade publication reports, and industry conjecture. BNSF's failure – once again – to state its enforcement terms renders the Revised Coal Dust Tariff an unreasonable practice.

IV.

THE REVISED COAL DUST TARIFF IS UNREASONABLE BECAUSE BNSF'S TRAIN PROFILING PRACTICES ARE ARBITRARY

BNSF's Revised Coal Dust Tariff, like the Original Coal Dust Tariff, requires shippers to "ensure that loaded uncovered coal cars will be profiled in accordance with BNSF's published template entitled 'Redesigned Chute Diagram' located in Appendix A to this publication." *Id.* The "Redesigned Chute Diagram" reflects the results of private sector negotiations.

Several years ago, PRB coal shippers, mines, BNSF and UP agreed that PRB mines would modify their loading chutes to produce a bread-loaf profile shown in the Revised Chute Diagram. The bread-loaf shaped profile "is designed to reduce coal dust emission by reducing the effect of air currents on loaded coal."[80] All PRB mines have installed "redesigned chutes" and are using them.[81]

However, BNSF is not content with the parties' private sector bargaining. Instead, following the publication of the Original Coal Dust Tariff it began to "laser"

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[80] Dust I Decision at 12.

[81] BNSF Dust I Op. at 13; Dust I Decision at 12.

trains[82] at locations many miles away from mine origins and, if BNSF's laser imaging indicated that trains did not meet the tariff profiling requirements, BNSF sent notices to coal shippers asserting that the shipper's trains were not in compliance with the tariff profiling requirements.[83] BNSF has now installed a permanent laser monitor near Milepost 91 on the Joint Line.[84]

BNSF's profile monitoring procedures are unreasonable. Once a train leaves a mine, any number of operating and weather factors can modify the train profile. *See* Viz V.S. at 30. Shippers should not be deemed to be in non-compliance with profiling standards due to events beyond their control.[85] Nor, unlike the application of surfactants, is there any "safe harbor" for train profiling.

BNSF could easily modify a reasonable containment-based coal dust tariff to address Coal Shippers' profile monitoring concerns by including language stating that a shipper will be deemed in compliance with BNSF's current Redesigned Chute Diagram

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[82] BNSF refers to this laser-based equipment as its "Coal Car Loading Profiling System" or "CCLPS"). *See* BNSF Dust II Discovery Responses at 10.

[83] *See* WCTL Dust I Reb. at 65; BNSF Dust I Op., VanHook V.S. at 16.

[84] *See* Dust I, Opening Evidence and Argument of Union Pacific Railroad Company, Verified Statement of Douglas Glass at 10 (Mar. 16, 2010). The CCLPS at MP 91 is over 27 miles from the southern-most PRB mine (Antelope) and over 107 miles from the northern-most PRB mine (Buckskin). *See* BNSF Railway, Powder River Division, Timetable No. 8 (effective Nov. 29, 2006) *available at* www.huntsvillenewswire.com/RailroadInfo/BNSF%20Timetables/Powder%20River%20Division.pdf.

[85] *See* Dust I Decision at 13-14 ("After the loading has taken place, the shipment is under control of the railroad and subject to the vagaries of wind, weather, train speed, and track conditions. Once the movement is in transit, there is nothing the shipper can do to comply. Clearly, this suggests that the proper place to focus shipper efforts to minimize coal dust emissions must be at the load-out.").

if its mine operators have installed, and are using, loading chutes that conform to the Diagram specifications.

V.

THE REVISED TARIFF IS UNREASONABLE BECASE BNSF UNLAWFULLY ATTEMPTS TO INSULATE ITSELF FROM LIABILITY

The Revised Coal Dust Tariff provides that "[a]ny product including topper agents, devices, or appurtenance utilized by Shipper or Shipper's mine agents to control the release of coal dust shall not adversely impact railroad employees, property, locomotives or owned cars." *Id.* The Original Coal Dust Tariff contained similar text.

It is fundamentally unfair for BNSF to mandate train spraying, and train profiling, using BNSF-approved sprays and loading chutes, and then say that shippers are responsible for all liability arising from compliance with these mandates. BNSF wants it both ways: BNSF demands that shippers comply with its mandates, but then absolves itself from any corresponding responsibilities for liability to its employees, property, locomotives or owned cars, including liability arising from its own negligence or the negligence of its own employees.

Not only are BNSF's liability-shifting rules fundamentally unfair, they are also patently unlawful. Shipper, and BNSF, liability to BNSF's "employees, property, locomotives or owned cars" is governed by state tort law or other laws not administered by the STB. BNSF cannot use its tariff writing power to limit liability imposed by law. *See, e.g., Perishable Freight Investigation*, 56 I.C.C. 449, 483 (1920) ("tariff provisions

which purport to . . . fix limitations of the carriers' liability . . . [are] generally objectionable"); *Rules, Regulations, & Practices of Regulated Carriers With Respect to the Processing of Loss & Damage Claims*, 340 I.C.C. 515, 520 (1972) (common carriers may not "limit their liability for negligence"); *Provisions on Vegetables & Melons, Transcontinental*, 340 I.C.C. 807, 815 (1972) ("it would be an unreasonable practice . . . for a railroad to establish . . . claims rules that are clearly inconsistent with their liability under established law"); *Wooden Grain Doors, Burlington N., Inc.*, 350 I.C.C. 768, 774-75 (1975) (carriers may not promulgate tariff rules governing liability for torts "over which this Commission has no jurisdiction").

BNSF can simply and easily remedy this unreasonable practice by removing the liability limitations.

VI.

REQUESTED RELIEF

Coal Shippers request that the Board find that BNSF's publication of the Revised Coal Dust tariff constitutes an unreasonable practice. Coal Shippers further request that the Board once again urge BNSF to work collaboratively with its PRB coal shippers to devise a reasonable approach to coal dust mitigation issues. Finally, Coal Shippers request that the Board instruct BNSF that any new coal dust tariff provisions be based on sound emission testing; provide for the reasonable reimbursement of coal shippers' compliance costs; establish specific, reasonable enforcement terms; eliminate unfair coal profile monitoring; and remove all liability limitations.

Respectfully submitted,

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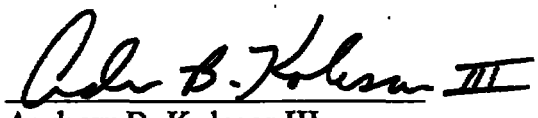
Dated: October 1, 2012

CERTIFICATE OF SERVICE

I hereby certify that this 1st day of October, 2012, I have served a copy of the Opening Evidence and Argument of Western Coal Traffic League, American Public Power Association, Edison Electric Institute, and National Rural Electric Cooperative Association to be served via first-class mail, postage prepaid, upon counsel for BNSF Railway Company. I further certify that this 1st day of October, 2012, I have served public copies of the forgoing via first-class mail, postage prepaid, upon the parties of record to this case.



Andrew B. Kolesar III

Counsel's Exhibit No. 1

BNSF's Revised Coal Dust Tariff (excerpts)

BNSF 6041-B

Rev. 16, Issued July 14, 2011

Rev. 17, Issued July 20, 2011

Rev. 18, Issued September 15, 2011

Rev. 19, Issued September 19, 2011

Rev. 20, Issued September 26, 2011

BNSF 6041-B

Rev. 16, Issued July 14, 2011

BNSF PRICE LIST 6041-B
(Cancels BNSF Freight Tariff 6041-A)

PROVIDING

RULES AND REGULATIONS GOVERNING UNIT TRAIN AND VOLUME ALL-RAIL

COAL SERVICE, ALSO ACCESSORIAL SERVICES AND CHARGES THEREFOR

APPLYING AS PROVIDED IN PRICE LIST

ISSUED: July 14, 2011 EFFECTIVE: October 1, 2011
Issued by BNSF Price Management, P.O. Box 961069, Ft. Worth, TX 76161-0069

ITEM 100
COAL DUST MITIGATION REQUIREMENTS

1. To prevent contamination of the rail ballast caused by fugitive coal dust, BNSF is modifying the loading requirement applicable to all coal cars loaded at Powder River Basin ("PRB") mines by shippers whose coal transportation is subject to this Rules Book.

2. Effective October 1, 2011, shippers loading coal at any PRB mine must take measures to load coal in such a way that any loss in transit of coal dust from the shipper's loaded coal cars will be reduced by at least 85 percent as compared to loss in transit of coal dust from coal cars where no remedial measures have been taken. At least 30 days prior to loading cars for shipment by BNSF, a Shipper shall provide BNSF with written notice of compliance efforts.

3. A shipper will be deemed to be in compliance with the loading requirement set out in this Item if the shipper satisfies Sections 3.A and 3.B below or pursues the option in Section 4 below:

A. Shipper ensures that loaded uncovered coal cars will be profiled in accordance with BNSF's published template entitled "Redesigned Chute Diagram" located in Appendix A to this publication.

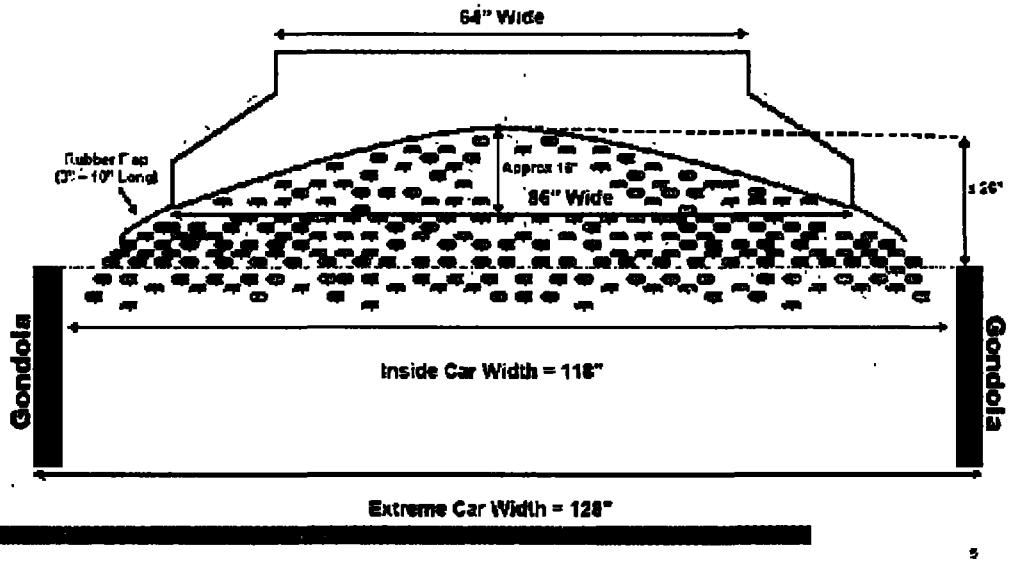
B. Shipper ensures that an acceptable topper agent (e.g., surfactant) will be properly applied to the entire surface of all loaded coal cars at an effective concentration level and in accordance with the manufacturer's specifications. An acceptable topper agent is one that has been shown to reduce coal dust loss in transit by 85%. In recent tests carried out in the PRB, three topper agents meet this criteria when properly applied. Appendix B to this publication lists these topper agents. Proper use of any one of the topper agents on the approved list in accordance with the manufacturer's specifications and at the application rates specified in Appendix B, will satisfy this safe harbor provision. BNSF will consider other topper agents to be acceptable for purposes of this safe harbor provision if the shipper can demonstrate that appropriate testing has shown that the topper agent achieves compliance with this Item. Guidelines for the testing of new topper agents will be provided upon request.

4. Shipper may seek inclusion of any other method of coal dust suppression (*e.g.*, compaction or other technology) in the safe harbor provision of Section 3.B above by submitting a compliance plan to BNSF that provides evidence demonstrating that an additional proposed compliance measure will result in compliance with this Item. Shipper must also satisfy the profiling requirement of Section 3.A above. Any product including topper agents, devices or appurtenance utilized by the Shipper or Shipper's mine agents to control the release of coal dust shall not adversely impact railroad employees, property, locomotives or owned cars.

APPENDIX A

REDESIGNED CHUTE DIAGRAM

Redesigned Chute Diagram



APPENDIX B

Acceptable Topper Agents and Application Rates

Topper Agents [1]	Concentration Rate per Car [2]	Total Solution Applied per Railcar [3]
Nalco Dustbind Plus	1.5 gal	15 gal
Midwest Soil-Sement	1.25 gal	18.75 gal
AKJ CTS-100	1.36 gal	15 gal

(1) For Topper Application only.
(2) The amount of topper agent mixed into a solution for each Railcar. These concentration rates were established during testing carried out in the PRB in 2010.
(3) The amount of topper agent applied to each Railcar.

BNSF 6041-B

Rev. 17, Issued July 20, 2011

BNSF PRICE LIST 6041-B
(Cancels BNSF Freight Tariff 6041-A)

PROVIDING

RULES AND REGULATIONS GOVERNING UNIT TRAIN AND VOLUME ALL-RAIL

COAL SERVICE, ALSO ACCESSORIAL SERVICES AND CHARGES THEREFOR

APPLYING AS PROVIDED IN PRICE LIST

ISSUED: July 20, 2011 EFFECTIVE: July 20, 2011
Issued by BNSF Price Management, P.O. Box 961069, Ft. Worth, TX 76161-0069

ITEM 100
COAL DUST MITIGATION REQUIREMENTS

1. To prevent contamination of the rail ballast caused by fugitive coal dust, BNSF is modifying the loading requirement applicable to all coal cars loaded at Powder River Basin ("PRB") mines by shippers whose coal transportation is subject to this Rules Book.

2. Effective October 1, 2011, shippers loading coal at any PRB mine must take measures to load coal in such a way that any loss in transit of coal dust from the shipper's loaded coal cars will be reduced by at least 85 percent as compared to loss in transit of coal dust from coal cars where no remedial measures have been taken. At least 30 days prior to loading cars for shipment by BNSF, a Shipper shall provide BNSF with written notice of compliance efforts.

3. A shipper will be deemed to be in compliance with the loading requirement set out in this Item if the shipper satisfies Sections 3.A and 3.B below or pursues the option in Section 4 below:

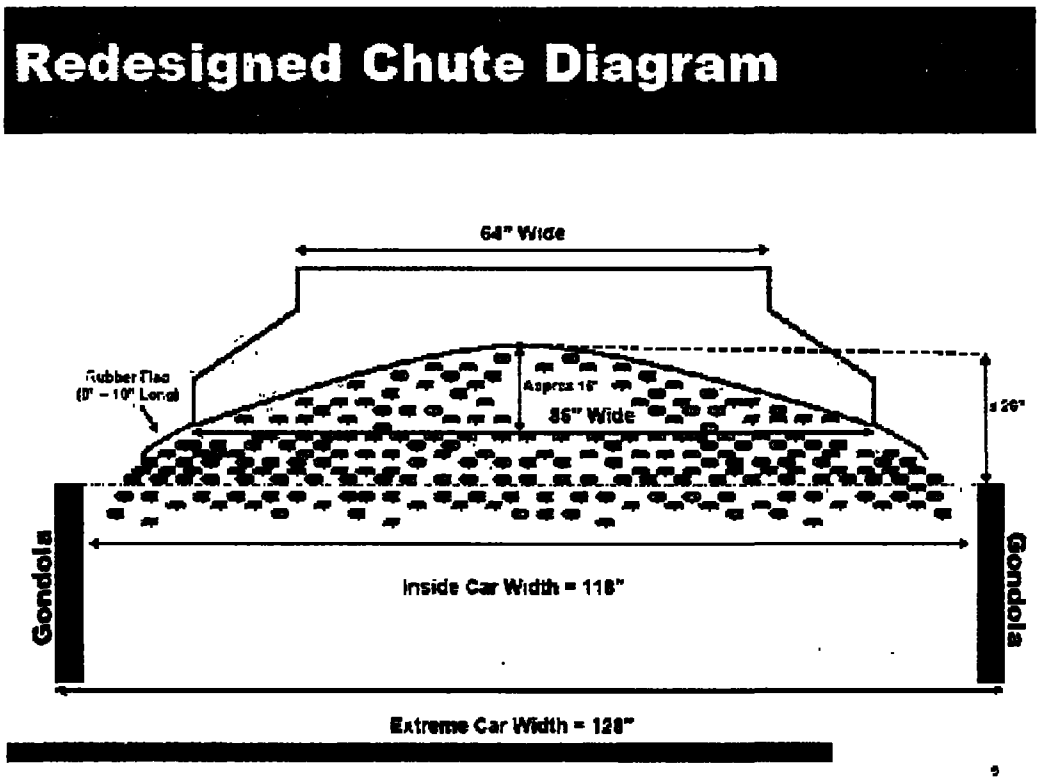
A. Shipper ensures that loaded uncovered coal cars will be profiled in accordance with BNSF's published template entitled "Redesigned Chute Diagram" located in Appendix A to this publication.

B. Shipper ensures that an acceptable topper agent (e.g., surfactant) will be properly applied to the entire surface of all loaded coal cars at an effective concentration level and in accordance with the manufacturer's specifications. An acceptable topper agent is one that has been shown to reduce coal dust loss in transit by 85%. In recent tests carried out in the PRB, three topper agents meet this criteria when properly applied. Appendix B to this publication lists these topper agents. Proper use of any one of the topper agents on the approved list in accordance with the manufacturer's specifications and at the application rates specified in Appendix B, will satisfy this safe harbor provision. BNSF will consider other topper agents to be acceptable for purposes of this safe harbor provision if the shipper can demonstrate that appropriate testing has shown that the topper agent achieves compliance with this Item. Guidelines for the testing of new topper agents will be provided upon request.

4. Shipper may seek inclusion of any other method of coal dust suppression (*e.g.*, compaction or other technology) in the safe harbor provision of Section 3.B above by submitting a compliance plan to BNSF that provides evidence demonstrating that an additional proposed compliance measure will result in compliance with this Item. Shipper must also satisfy the profiling requirement of Section 3.A above. Any product including topper agents, devices or appurtenance utilized by the Shipper or Shipper's mine agents to control the release of coal dust shall not adversely impact railroad employees, property, locomotives or owned cars.

APPENDIX A

REDESIGNED CHUTE DIAGRAM



APPENDIX B

Acceptable Topper Agents and Application Rates

Topper Agents [1]	Concentration Rate per Car [2]	Total Solution Applied per Railcar [3]
Nalco Dustbind Plus	2.0 gal	20 gal
Midwest Soil-Sement	1.25 gal	18.75 gal
AKJ CTS-100	1.36 gal	15 gal

(1) For Topper Application only.
(2) The amount of topper agent mixed into a solution for each Railcar. These concentration rates were established during testing carried out in the PRB in 2010.
(3) The amount of topper agent applied to each Railcar.

BNSF 6041-B

Rev. 18, Issued September 15, 2011

BNSF PRICE LIST 6041-B
(Cancels BNSF Freight Tariff 6041-A)

PROVIDING

RULES AND REGULATIONS GOVERNING UNIT TRAIN AND VOLUME ALL-RAIL

COAL SERVICE, ALSO ACCESSORIAL SERVICES AND CHARGES THEREFOR

APPLYING AS PROVIDED IN PRICE LIST

ISSUED: September 15, 2011 EFFECTIVE: September 15, 2011
Issued by BNSF Price Management, P.O. Box 961069; Ft. Worth, TX 76161-0069

ITEM 100
COAL DUST MITIGATION REQUIREMENTS

1. To prevent contamination of the rail ballast caused by fugitive coal dust, BNSF is modifying the loading requirement applicable to all coal cars loaded at Powder River Basin ("PRB") mines by shippers whose coal transportation is subject to this Rules Book.

2. Effective October 1, 2011, shippers loading coal at any PRB mine must take measures to load coal in such a way that any loss in transit of coal dust from the shipper's loaded coal cars will be reduced by at least 85 percent as compared to loss in transit of coal dust from coal cars where no remedial measures have been taken. At least 30 days prior to loading cars for shipment by BNSF, a Shipper shall provide BNSF with written notice of compliance efforts.

3. A shipper will be deemed to be in compliance with the loading requirement set out in this Item if the shipper satisfies Sections 3.A and 3.B below or pursues the option in Section 4 below:

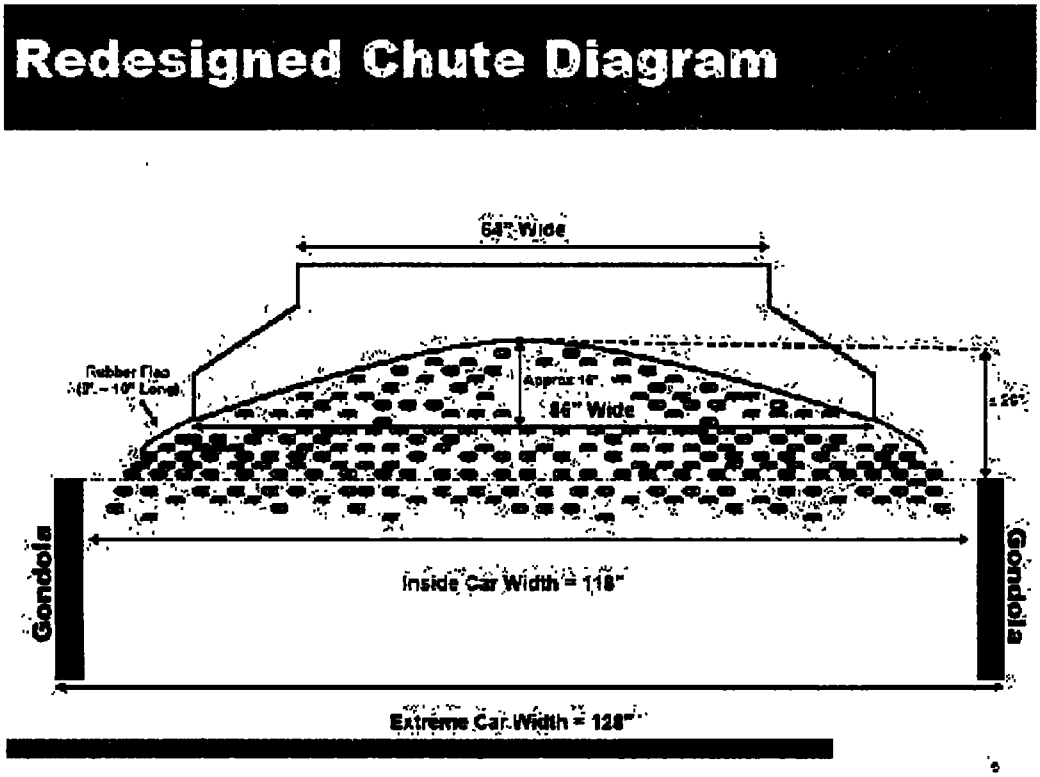
A. Shipper ensures that loaded uncovered coal cars will be profiled in accordance with BNSF's published template entitled "Redesigned Chute Diagram" located in Appendix A to this publication.

B. Shipper ensures that an acceptable topper agent (e.g., surfactant) will be properly applied to the entire surface of all loaded coal cars at an effective concentration level and in accordance with the manufacturer's specifications. An acceptable topper agent is one that has been shown to reduce coal dust loss in transit by 85%. Appendix B to this publication lists the topper agents that meet this criteria. Proper use of any one of the topper agents on the approved list in accordance with the manufacturer's specifications and at the application rates specified in Appendix B, will satisfy this safe harbor provision. BNSF will consider other topper agents to be acceptable for purposes of this safe harbor provision if the shipper can demonstrate that appropriate testing has shown that the topper agent achieves compliance with this Item. Guidelines for the testing of new topper agents will be provided upon request.

4. Shipper may seek inclusion of any other method of coal dust suppression (*e.g.*, compaction or other technology) in the safe harbor provision of Section 3.B above by submitting a compliance plan to BNSF that provides evidence demonstrating that an additional proposed compliance measure will result in compliance with this Item. Shipper must also satisfy the profiling requirement of Section 3.A above. Any product including topper agents, devices or appurtenance utilized by the Shipper or Shipper's mine agents to control the release of coal dust shall not adversely impact railroad employees, property, locomotives or owned cars.

APPENDIX A

REDESIGNED CHUTE DIAGRAM



APPENDIX B

Acceptable Topper Agents and Application Rates

Topper Agents [1]	Concentration Rate per Car [2]	Total Solution Applied per Railcar [3]
Nalco Dustbind Plus	2.0 gal	20 gal
Midwest Soil-Sement	1.25 gal	18.75 gal
AKJCTX-100	1.36 gal[4]	15 gal
AKJ CTS-100C	1.36 gal[4]	15 gal
Rantec Capture 3000	2.5 lbs	20 gal

(1) For Topper Application only.
(2) The amount of topper agent mixed into a solution for each Railcar. These concentration rates were established during testing.
(3) The amount of topper agent applied to each Railcar.
(4) 1.36 gallons of concentrate (CTS-100C) mixed with 13.64 gallons of Water.

BNSF 6041-B

Rev. 19, Issued September 19, 2011

BNSF PRICE LIST 6041-B
(Cancels BNSF Freight Tariff 6041-A)

PROVIDING

RULES AND REGULATIONS GOVERNING UNIT TRAIN AND VOLUME ALL-RAIL

COAL SERVICE, ALSO ACCESSORIAL SERVICES AND CHARGES THEREFOR

APPLYING AS PROVIDED IN PRICE LIST

ISSUED: September 19, 2011 EFFECTIVE: October 9, 2011
Issued by BNSF Price Management, P.O. Box 961069, Ft. Worth, TX 76161-0069

ITEM 100
COAL DUST MITIGATION REQUIREMENTS

1. To prevent contamination of the rail ballast caused by fugitive coal dust, BNSF is modifying the loading requirement applicable to all coal cars loaded at Montana and Wyoming mines by shippers whose coal transportation is subject to this Rules Book.

2. Effective October 1, 2011, shippers loading coal at any Montana and Wyoming mine must take measures to load coal in such a way that any loss in transit of coal dust from the shipper's loaded coal cars will be reduced by at least 85 percent as compared to loss in transit of coal dust from coal cars where no remedial measures have been taken. At least 30 days prior to loading cars for shipment by BNSF, a Shipper shall provide BNSF with written notice of compliance efforts.

3. A shipper will be deemed to be in compliance with the loading requirement set out in this Item if the shipper satisfies Sections 3.A and 3.B below or pursues the option in Section 4 below:

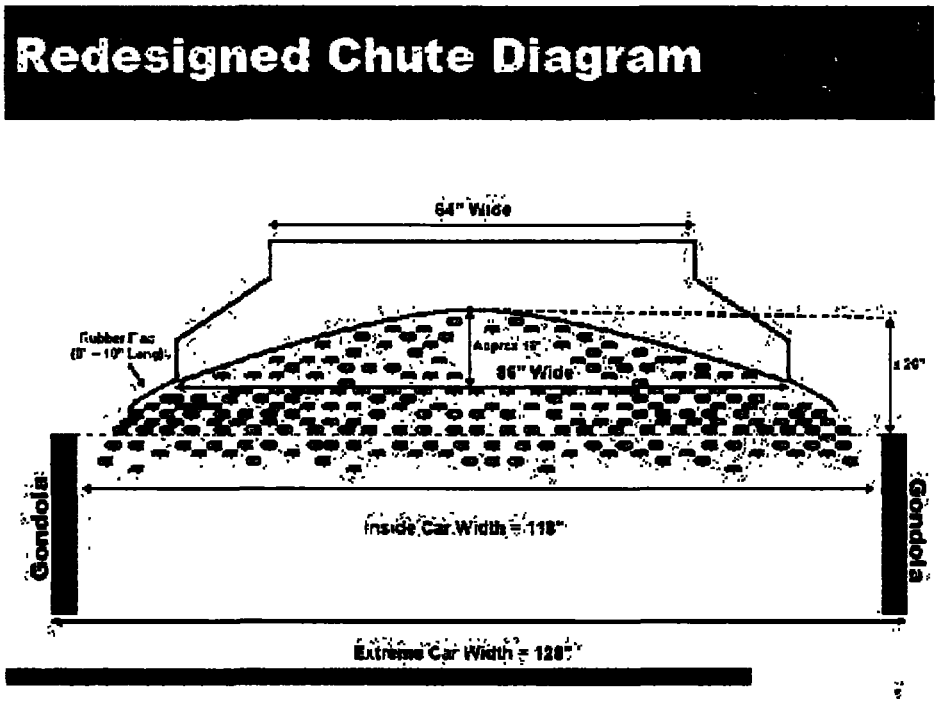
A. Shipper ensures that loaded uncovered coal cars will be profiled in accordance with BNSF's published template entitled "Redesigned Chute Diagram" located in Appendix A to this publication.

B. Shipper ensures that an acceptable topper agent (e.g., surfactant) will be properly applied to the entire surface of all loaded coal cars at an effective concentration level and in accordance with the manufacturer's specifications. An acceptable topper agent is one that has been shown to reduce coal dust loss in transit by 85%. Appendix B to this publication lists the topper agents that meet this criteria. Proper use of any one of the topper agents on the approved list in accordance with the manufacturer's specifications and at the application rates specified in Appendix B, will satisfy this safe harbor provision. BNSF will consider other topper agents to be acceptable for purposes of this safe harbor provision if the shipper can demonstrate that appropriate testing has shown that the topper agent achieves compliance with this Item. Guidelines for the testing of new topper agents will be provided upon request.

4. Shipper may seek inclusion of any other method of coal dust suppression (*e.g.*, compaction or other technology) in the safe harbor provision of Section 3.B above by submitting a compliance plan to BNSF that provides evidence demonstrating that an additional proposed compliance measure will result in compliance with this Item. Shipper must also satisfy the profiling requirement of Section 3.A above. Any product including topper agents, devices or appurtenance utilized by the Shipper or Shipper's mine agents to control the release of coal dust shall not adversely impact railroad employees, property, locomotives or owned cars.

APPENDIX A

REDESIGNED CHUTE DIAGRAM



APPENDIX B

Acceptable Topper Agents and Application Rates

Topper Agents [1]	Concentration Rate per Car [2]	Total Solution Applied per Railcar [3]
Nalco Dustbind Plus	2.0 gal	20 gal
Midwest Soil-Sement	1.25 gal	18.75 gal
AKJ CTS-100	1.36 gal[4]	15 gal
AKJ CTS-100C	1.36 gal[4]	15 gal
Rantec Capture 3000	2.5 lbs	20 gal

(1) For Topper Application only.
(2) The amount of topper agent mixed into a solution for each Railcar. These concentration rates were established during testing. c
(3) The amount of topper agent applied to each Railcar.
(4) 1.36 gallons of concentrate (CTS-100C mixed with 13.64 gallons of water.

BNSF 6041-B

Rev. 20, Issued September 26, 2011

BNSF PRICE LIST 6041-B
(Cancels BNSF Freight Tariff 6041-A)

PROVIDING

RULES AND REGULATIONS GOVERNING UNIT TRAIN AND VOLUME ALL-RAIL

COAL SERVICE, ALSO ACCESSORIAL SERVICES AND CHARGES THEREFOR

APPLYING AS PROVIDED IN PRICE LIST

ISSUED: September 19, 2011 EFFECTIVE: October 9, 2011
Issued by BNSF Price Management, P.O. Box 961069, Ft. Worth, TX 76161-0069

RULES AND OTHER GOVERNING PROVISIONS

ITEM 100
COAL DUST MITIGATION REQUIREMENTS

1. To prevent contamination of the rail ballast caused by fugitive coal dust, BNSF is modifying the loading requirement applicable to all coal cars loaded at Montana and Wyoming mines by shippers whose coal transportation is subject to this Rules Book.

2. Effective October 1, 2011, shippers loading coal at any Montana and Wyoming mine must take measures to load coal in such a way that any loss in transit of coal dust from the shipper's loaded coal cars will be reduced by at least 85 percent as compared to loss in transit of coal dust from coal cars where no remedial measures have been taken. At least 30 days prior to loading cars for shipment by BNSF, a Shipper shall provide BNSF with written notice of compliance efforts.

3. A shipper will be deemed to be in compliance with the loading requirement set out in this Item if the shipper satisfies Sections 3.A and 3.B below or pursues the option in Section 4 below:

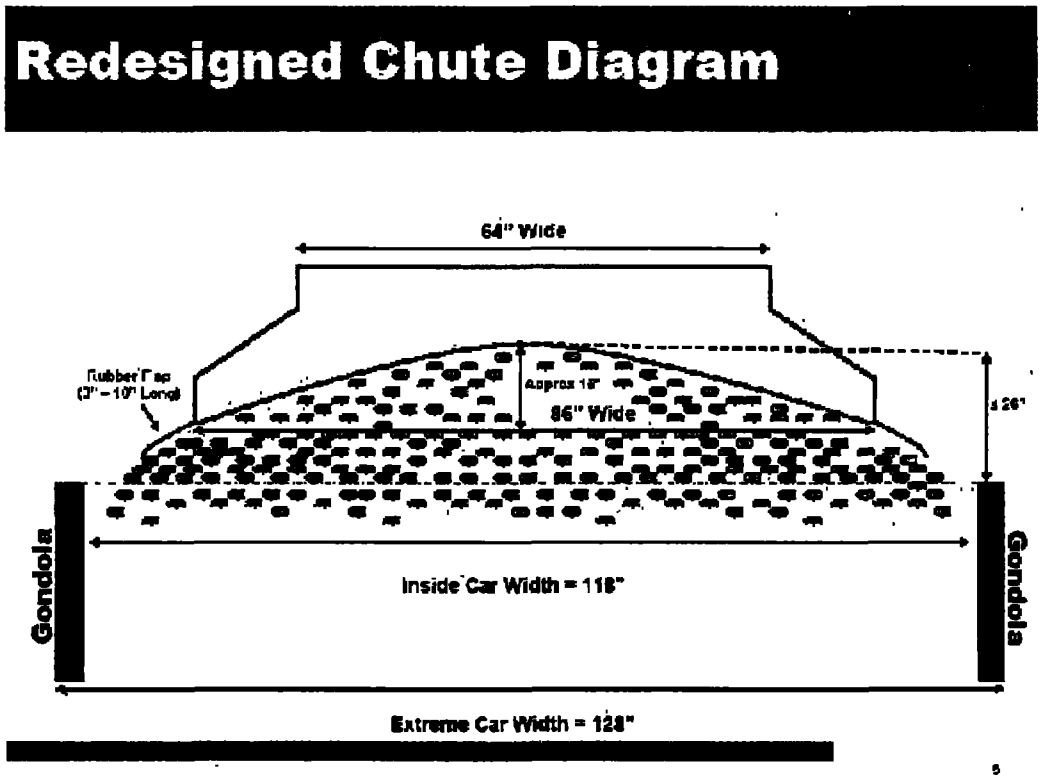
A. Shipper ensures that loaded uncovered coal cars will be profiled in accordance with BNSF's published template entitled "Redesigned Chute Diagram" located in Appendix A to this publication.

B. Shipper ensures that an acceptable topper agent (e.g., surfactant) will be properly applied to the entire surface of all loaded coal cars at an effective concentration level and in accordance with the manufacturer's specifications. An acceptable topper agent is one that has been shown to reduce coal dust loss in transit by 85%. Appendix B to this publication lists the topper agents that meet this criteria. Proper use of any one of the topper agents on the approved list in accordance with the manufacturer's specifications and at the application rates specified in Appendix B, will satisfy this safe harbor provision. BNSF will consider other topper agents to be acceptable for purposes of this safe harbor provision if the shipper can demonstrate that appropriate testing has shown that the topper agent achieves compliance with this Item. Guidelines for the testing of new topper agents will be provided upon request.

4. Shipper may seek inclusion of any other method of coal dust suppression (*e.g.*, compaction or other technology) in the safe harbor provision of Section 3.B above by submitting a compliance plan to BNSF that provides evidence demonstrating that an additional proposed compliance measure will result in compliance with this Item. Shipper must also satisfy the profiling requirement of Section 3.A above. Any product including topper agents, devices or appurtenance utilized by the Shipper or Shipper's mine agents to control the release of coal dust shall not adversely impact railroad employees, property, locomotives or owned cars.

APPENDIX A

REDESIGNED CHUTE DIAGRAM



RULES AND OTHER GOVERNING PROVISIONS

APPENDIX B

Acceptable Topper Agents and Application Rates

Topper Agents [1]	Concentration Rate per Car [2]	Total Solution Applied per Railcar [3]
Nalco Dustbind Plus	2.0 gal	20 gal
Midwest Soil-Sement	1.25 gal	18.75 gal
AKJ CTS-100	1.36 gal[4]	15 gal
AKJ CTS-100C	1.36 gal[4]	15 gal
Rantec Capture 3000	2.5 lbs	20 gal
MinTech Min Topper S+0150	1.1 gal	20 gal

(1) For Topper Application only.
(2) The amount of topper agent mixed into a solution for each Railcar. These concentration rates were established during testing. c
(3) The amount of topper agent applied to each Railcar.
(4) 1.36 gallons of concentrate (CTS-100C) mixed with 13.64 gallons of water.

Counsel's Exhibit No. 2

UP Coal Dust Tariff Rules

UP Circular 6603-C, Items 215 and 216

Issued September 8, 2011

UP Circular 6603-C, Items 215-A and 216-A

Issued September 26, 2012

UP Circular 6603-C, Items 215 and 216

Issued September 8, 2011

UP CIRCULAR 6603-C

Applying on Loading, Handling, Accessorial Charges,

Fuel Surcharges and

General Rules for Coal Trains Originating in Wyoming

Governed except as otherwise provided herein, by UFC 6000, OPSL 6000, UP 6004, and UP 6007-series.

Issued By:
E. A. HUNTER - MANAGER PRICING SERVICES
B. A. ROMMEL - MANAGER PRICING SERVICES

Union Pacific Railroad Company
1400 Douglas Street Omaha, NE 68179

Issued: March 3, 2006
Effective: March 15, 2006

RECOMMENDED LOADING MEASURES TO MITIGATE COAL DUST

This General Rule Item shall apply to contracts, transportation agreements or UPCQ's executed or issued on or prior to September 30, 2011.

1. For trains loaded at any Powder River Basin mine for subsequent movement on UP, Shipper is responsible for loading cars with coal in such a way that coal dust loss in transit from Shipper's loaded cars will be reduced by at least 85% as compared to loss of coal dust from loaded coal cars where no remedial measures were taken.

2. Loaded coal trains will be deemed to be in compliance with the standard in paragraph 1 if the trainloads meet the specifications in the General Order or Timetable for Powder River Division, Special Conditions involving Coal Mines issued by BNSF, the rail carrier designated by the ICC/STB as authorized to establish operating rules for the Joint Line ("Operating Rule"). Specifically either:

   a. Shipper or Shipper's Loading Operator should arrange (i) to load uncovered coal cars in accordance with the profile as published in the BNSF template drawing number 565000 http://www.bnsf.com/customers/what-can-i-ship/coal/coal-dust/pdf/q4.pdf and (ii) to properly apply an acceptable topper agent (e.g. surfactant) to the entire surface of coal in all cars in a trainload at an effective concentration level and in accordance with manufacturers' specifications. Topper agents and concentration rates currently considered as proven satisfactory by BNSF, if used in accordance with the manufacturers' specifications, are shown in table below:

Topper Agents (1)	Concentration Rate per Rail Car (2)	Total Solution Applied per Rail Car (3)
Nalco Dustbind Plus	2.0 gallons	20 gallons
Midwest Soil-Sement	1.25 gallons	18.75 gallons
AKJ CTS-100	1.36 gallons	15 gallons

Notes to Table Above:
(1) For Topper Application only.
(2) The amount of topper agent mixed into a solution for each loaded Railcar. These concentration rates were established during testing carried out in PRB in 2010.
(3) The amount of topper agent applied to each loaded Railcar.

or

   b. Shipper or Shipper's Loading Operator may adopt an alternative coal dust mitigation plan involving other measures (e.g. compaction or other technology) and profiling in accordance with 2. a. (i) above; PROVIDED, HOWEVER, that Shipper or Shipper's Loading Operator must submit test results to BNSF that satisfy BNSF that the alternative proposed compliance measure(s) will result in compliance with paragraph 1. In addition, BNSF must be assured that any product involving topper agents. devices or appurtenances utilized to control the release of coal dust will not adversely impact railroad employees, property, locomotives or owned cars.

3. Shipper is encouraged to adopt measures to comply with Paragraph 2.a. as soon as practicable.

a. If Shipper chooses to load its trains in accordance with paragraph 2. a., Shipper should notify UP in writing of the steps it has taken. or directed its Loading Operator to take, to comply with this Item for each mine or load out in the Powder River Basin where Shipper anticipates loading coal into trains that will subsequently be transported over UP. The notice should include the approximate date when those trainloads will be profiled and a topping agent will be applied. Shipper is requested to provide this notice to UP no later than October 7, 2011.

b. If Shipper proposes to comply by using either an alternative topping agent or an alternative measure, the notice to UP should provide a description of the alternative topping agent or measure and when Customer or Customer's loading agent proposes to obtain BNSF approval of the alternative topping agent or measure. Shipper may notify UP of its choice to use an alternative whenever Shipper decides that it will demonstrate to BNSF that the alternative should be accepted. Until BNSF notifies Shipper and UP in writing that BNSF considers the testing results adequate assurance that the alternative satisfies the standard in paragraph 1, however, Shipper or Shipper's Loading Operator should load its trains in accordance with paragraph 2.a.

REQUIRED LOADING MEASURES TO MITIGATE COAL DUST

This General Rule Item shall apply (a) to all tariffs effective October 1, 2011 and (b) to contracts, transportation agreements or UPCQ's executed or issued after September 30, 2011.

1. For trains loaded at any Powder River Basin mine for subsequent movement on UP, Shipper is responsible for loading cars with coal in such a way that coal dust loss in transit from Shipper's loaded cars will be reduced by at least 85% as compared to loss of coal dust from loaded coal cars where no remedial measures were taken.

2. Loaded coal trains will be deemed to be in compliance with the standard in paragraph 1 if the trainloads meet the specifications in the General Order or Timetable for Powder River Division, Special Conditions involving Coal Mines issued by BNSF, the rail carrier designated by the ICC/STB as authorized to establish operating rules for the Joint Line ("Operating Rule"). Specifically either:

   a. Shipper or Shipper's Loading Operator must arrange (i) to load uncovered coal cars in accordance with the profile as published in the BNSF template drawing number 565000 http://www.bnsf.com/customers/what-can-i-ship/coal/coal-dust/pdf/q4.pdf and (ii) to properly apply an acceptable topper agent (e.g. surfactant) to the entire surface of coal in all cars in a trainload at an effective concentration level and in accordance with manufacturers' specifications. Topper agents and concentration rates currently considered as proven satisfactory by BNSF, if used in accordance with the manufacturers' specifications, are shown in table below:

Topper Agents (1)	Concentration Rate per Rail Car (2)	Total Solution Applied per Rail Car (3)
Nalco Dustbind Plus	2.0 gallons	20 gallons
Midwest Soil-Sement	1.25 gallons	18.75 gallons
AKJ CTS-100	1.36 gallons	15 gallons

Notes to Table Above:
(1) For Topper Application only.
(2) The amount of topper agent mixed into a solution for each loaded Railcar. These concentration rates were established during testing carried out in PRB in 2010.
(3) The amount of topper agent applied to each loaded Railcar.

or

   b. Shipper or Shipper's Loading Operator may adopt an alternative coal dust mitigation plan involving other measures (e.g. compaction or other technology) and profiling in accordance with 2. a. (i) above; PROVIDED, HOWEVER, that Shipper or Shipper's Loading Operator must submit test results to BNSF that satisfy BNSF that the alternative proposed compliance measure(s) will result in compliance with paragraph 1. In addition, BNSF must be assured that any product involving topper agents, devices or appurtenances utilized to control the release of coal dust will not adversely impact railroad employees, property, locomotives or owned cars.

3. In order for UP to comply with the BNSF Operating Rule regarding coal dust mitigation measures, Shippers must adopt measures to comply with this Item as soon as practicable.

a. Shipper must notify UP in writing of the steps it has taken, or directed its Loading Operator to take, in accordance with paragraph 2.a. to comply with this Item for each mine or load out in the Powder River Basin where Shipper anticipates loading coal into trains that will subsequently be transported over UP. The notice must include the approximate date when those trainloads will be profiled and a topping agent will be applied. Shipper must provide this notice to UP no later than October 7, 2011.

b. If Shipper proposes to comply by using either an alternative topping agent or an alternative measure, the notice to UP should provide a description of the alternative topping agent or measure and when Customer or Customer's loading agent proposes to obtain BNSF approval of the alternative topping agent or measure. Shipper may notify UP of its choice to use an alternative whenever Shipper decides that it will demonstrate to BNSF that the alternative should be accepted. Until BNSF notifies Shipper and UP in writing that BNSF considers the testing results adequate assurance that the alternative satisfies the standard in paragraph 1, however, Shipper or Shipper's Loading Operator must load its trains in accordance with paragraph 2.a.

UP Circular 6603-C, Items 215-A and 216-A

Issued September 26, 2012

UP CIRCULAR 6603-C

Applying on Loading, Handling, Accessorial Charges,

Fuel Surcharges and

General Rules for Coal Trains Originating in Wyoming

Governed except as otherwise provided herein, by UFC 6000, OPSL 6000, UP 6004, and UP 6007-series.

Issued By:
E. A. HUNTER - MANAGER PRICING SERVICES
B. A. ROMMEL - MANAGER PRICING SERVICES

Union Pacific Railroad Company
1400 Douglas Street Omaha, NE 68179

Issued. March 3, 2006
Effective: March 15, 2006

UP 6603-C	**Item:** 215-A RECOMMENDED LOADING MEASURES TO MITIGATE COAL DUST

RECOMMENDED LOADING MEASURES TO MITIGATE COAL DUST

This General Rule Item shall apply to contracts, transportation agreements or UPCQ's executed or issued on or prior to September 30, 2011.

1. For trains loaded at any Powder River Basin mine for subsequent movement on UP, Shipper is responsible for loading cars with coal in such a way that coal dust loss in transit from Shipper's loaded cars will be reduced by at least 85% as compared to loss of coal dust from loaded coal cars where no remedial measures were taken.

2. Loaded coal trains will be deemed to be in compliance with the standard in paragraph 1 if the trainloads meet the specifications in the General Order or Timetable for Powder River Division, Special Conditions involving Coal Mines issued by BNSF, the rail carrier designated by the ICC/STB as authorized to establish operating rules for the Joint Line ("Operating Rule"). Specifically either:

   a. Shipper or Shipper's Loading Operator should arrange (i) to load uncovered coal cars in accordance with the profile as published in the BNSF template drawing number 565000 http://www.bnsf.com/customers/what-can-i-ship/coal/coal-dust/pdf/q4.pdf and (ii) to properly apply an acceptable topper agent (e.g. surfactant) to the entire surface of coal in all cars in a trainload at an effective concentration level and in accordance with manufacturers' specifications. Topper agents and concentration rates currently considered as proven satisfactory by BNSF, if used in accordance with the manufacturers' specifications, are shown in table below: |c|

Topper Agents (1)	Concentration Rate per Rail Car (2)	Total Solution Applied per Rail Car (3)
Nalco Dustbind Plus	2.0 gallons	20 gallons
Midwest Soil-Sement	1.25 gallons	18.75 gallons
AKJ CTS-100	1.36 gallons (4)	15 gallons
AKJ CTS-100C	1.36 gallons (4)	15 gallons
Rantec Capture 3000	2.5 pounds	20 gallons
MinTech Min Topper S+0150	1.1 gallons	20 gallons

Notes to Table Above:
(1) For Topper Application only.
(2) The amount of topper agent mixed into a solution for each loaded Railcar. These concentration rates were established during testing carried out in the PRB.
(3) The amount of topper agent applied to each loaded Railcar.
(4) 1.36 gallons of concentrate (CTS-100C) mixed with 13.64 gallons of water.

or

   b. Shipper or Shipper's Loading Operator may adopt an alternative coal dust mitigation plan involving other measures (e.g. compaction or other technology) and profiling in accordance with 2. a. (i) above; PROVIDED, HOWEVER, that Shipper or Shipper's Loading Operator must submit test results to BNSF that satisfy BNSF that the alternative proposed compliance measure(s) will result in compliance with paragraph 1. In addition, BNSF must be assured that any product involving topper agents, devices or

appurtenances utilized to control the release of coal dust will not adversely impact railroad employees, property, locomotives or owned cars.

3. Shipper is encouraged to adopt measures to comply with Paragraph 2.a. as soon as practicable.

a. If Shipper chooses to load its trains in accordance with paragraph 2. a., Shipper should notify UP in writing of the steps it has taken, or directed its Loading Operator to take, to comply with this Item for each mine or load out in the Powder River Basin where Shipper anticipates loading coal into trains that will subsequently be transported over UP. The notice should include the approximate date when those trainloads will be profiled and a topping agent will be applied. Shipper is requested to provide this notice to UP no later than October 7, 2011.

b. If Shipper proposes to comply by using either an alternative topping agent or an alternative measure, the notice to UP should provide a description of the alternative topping agent or measure and when Customer or Customer's loading agent proposes to obtain BNSF approval of the alternative topping agent or measure. Shipper may notify UP of its choice to use an alternative whenever Shipper decides that it will demonstrate to BNSF that the alternative should be accepted. Until BNSF notifies Shipper and UP in writing that BNSF considers the testing results adequate assurance that the alternative satisfies the standard in paragraph 1, however, Shipper or Shipper's Loading Operator should load its trains in accordance with paragraph 2.a.

UP 6603-C	**Item:** 216-A REQUIRED LOADING MEASURES TO MITIGATE COAL DUST

REQUIRED LOADING MEASURES TO MITIGATE COAL DUST

This General Rule Item shall apply (a) to all tariffs effective October 1, 2011 and (b) to contracts, transportation agreements or UPCQ's executed or issued after September 30, 2011.

1. For trains loaded at any Powder River Basin mine for subsequent movement on UP, Shipper is responsible for loading cars with coal in such a way that coal dust loss in transit from Shipper's loaded cars will be reduced by at least 85% as compared to loss of coal dust from loaded coal cars where no remedial measures were taken.

2. Loaded coal trains will be deemed to be in compliance with the standard in paragraph 1 if the trainloads meet the specifications in the General Order or Timetable for Powder River Division, Special Conditions involving Coal Mines issued by BNSF, the rail carrier designated by the ICC/STB as authorized to establish operating rules for the Joint Line ("Operating Rule"). Specifically either:

   a. Shipper or Shipper's Loading Operator must arrange (i) to load uncovered coal cars in accordance with the profile as published in the BNSF template drawing number 565000 http://www.bnsf.com/customers/what-can-i-ship/coal/coal-dust/pdf/q4.pdf and (ii) to properly apply an acceptable topper agent (e.g. surfactant) to the entire surface of coal in all cars in a trainload at an effective concentration level and in accordance with manufacturers' specifications. Topper agents and concentration rates currently considered as proven satisfactory by BNSF, if used in accordance with the manufacturers' specifications, are shown in table below: [c]

Topper Agents (1)	Concentration Rate per Rail Car (2)	Total Solution Applied per Rail Car (3)
Nalco Dustbind Plus	2.0 gallons	20 gallons
Midwest Soil-Sement	1.25 gallons	18.75 gallons
AKJ CTS-100	1.36 gallons (4)	15 gallons
AKJ CTS-100C	1.36 gallons (4)	15 gallons
Rantec Capture 3000	2.5 pounds	20 gallons
MinTech Min Topper S+0150	1.1 gallons	20 gallons

Notes to Table Above:
(1) For Topper Application only.
(2) The amount of topper agent mixed into a solution for each loaded Railcar. These concentration rates were established during testing carried out in the PRB.
(3) The amount of topper agent applied to each loaded Railcar.
(4) 1.36 gallons of concentrate (CTS-100C) mixed with 13.64 gallons of water.

or

   b. Shipper or Shipper's Loading Operator may adopt an alternative coal dust mitigation plan involving other measures (e.g. compaction or other technology) and profiling in accordance with 2. a. (i) above; PROVIDED, HOWEVER, that Shipper or Shipper's Loading Operator must submit test results to BNSF that satisfy BNSF that the alternative proposed compliance measure(s) will result in compliance with paragraph 1. In addition, BNSF must be assured that any product involving topper agents, devices or

appurtenances utilized to control the release of coal dust will not adversely impact railroad employees, property, locomotives or owned cars.

3. In order for UP to comply with the BNSF Operating Rule regarding coal dust mitigation measures, Shippers must adopt measures to comply with this Item as soon as practicable.

   a. Shipper must notify UP in writing of the steps it has taken, or directed its Loading Operator to take, in accordance with paragraph 2.a. to comply with this Item for each mine or load out in the Powder River Basin where Shipper anticipates loading coal into trains that will subsequently be transported over UP. The notice must include the approximate date when those trainloads will be profiled and a topping agent will be applied.

   b. If Shipper proposes to comply by using either an alternative topping agent or an alternative measure, the notice to UP should provide a description of the alternative topping agent or measure and when Customer or Customer's loading agent proposes to obtain BNSF approval of the alternative topping agent or measure. Shipper may notify UP of its choice to use an alternative whenever Shipper decides that it will demonstrate to BNSF that the alternative should be accepted. Until BNSF notifies Shipper and UP in writing that BNSF considers the testing results adequate assurance that the alternative satisfies the standard in paragraph 1, however, Shipper or Shipper's Loading Operator must load its trains in accordance with paragraph 2.a.

Viz

BEFORE THE
SURFACE TRANSPORTATION BOARD

FINANCE DOCKET NO. 35557

REASONABLENESS OF BNSF RAILWAY COMPANY COAL DUST MITIGATION TARIFF PROVISIONS

VERIFIED STATEMENT OF

MARK J. VIZ, Ph.D., P.E.

ON BEHALF OF

WESTERN COAL TRAFFIC LEAGUE, AMERICAN PUBLIC POWER ASSOCIATION, EDISON ELECTRIC INSTITUTE AND NATIONAL RURAL ELECTRIC COOPERATIVE ASSOCIATION

Public Version

Confidential and Highly Confidential Information has been Redacted

DATED: OCTOBER 1, 2012

1. Introduction.

a. My name is Mark J. Viz. I am a principal engineer with Exponent, Inc., an engineering, scientific, health and environmental consulting firm headquartered in Menlo Park, California. I am based in Exponent's Chicago, Illinois, office. For the past thirteen years I have performed engineering and/or engineering consultation work in a variety of aspects of mechanical performance, material handling, transportation and unintended releases of hazardous materials, and certain aspects of derailment cause and origin studies particular to rail transportation. From 2007 through 2009, I was the project manager and technical lead for a detailed study of coal loss, monitoring and measurement issues involving the movement of coal by rail on the "Joint Line" in the Powder River Basin. Part of that study involved the use of "Passive Dust Collectors," supplied to us by BNSF, for the performance of lengthy and detailed field testing of railcars loaded with coal and then profiled for full-scale wind testing. This study was funded by a consortium of member companies of the National Coal Transportation Association (NCTA). I have attached a copy of my current curriculum vitae (Exhibit MJV-1) to this statement.

b. Previously, I had been requested by the Western Coal Traffic League (WCTL) to analyze some of the means and methods that BNSF has used to attempt to monitor and measure coal dust emissions from loaded railcars in transit. These analyses are set forth in my Verified Statements submitted as part of WCTL's Opening, Reply, Rebuttal and Petition to Reopen filings in Surface Transportation Board ("STB" or "Board") Finance Docket No. 35305, Arkansas Electric Cooperative Corporation – Petition For Declaratory Order (so-called "Dust I").

c. Presently, I have been asked to comment on (1) BNSF's use of "Passive Dust Collectors" (also referred to as "passive collectors") as a means *to measure* the amount, if any, of fugitive coal dust emissions from moving coal railcars; (2) BNSF's use of laser scanning or other technology to monitor or "verify" that the

loaded top-of-car coal heap profile meets the precise requirements of BNSF's "bread loaf" railcar profiling requirements set forth in Appendix A to the Revised Coal Dust Tariff;[1] and (3) the factors that determine if, when and to what extent fugitive emissions will occur in the transportation of loaded railcars.

d. Passive Dust Collectors, as designed and implemented for use by BNSF's consultant, Simpson Weather Associates (SWA), and as used by BNSF (to the extent that BNSF and SWA's methods and procedures have been disclosed), cannot be used to scientifically establish the amount, if any, of fugitive particulate emissions from railcars with certainty, reliability or repeatability, nor can they be used to scientifically establish the quantitative effectiveness (in terms of percent reduction in dust emissions), if any, of the application of coal dust suppressants, in reducing fugitive particulate emissions with certainty, reliability or repeatability.

e. I also note at the outset that many if not all of the dust suppressants were designed for use in dust mitigation from static coal stockpiles at coal-burning power plants or similar facilities. In this regard these products are generally recognized to work when applied to a large pile of coal *that is stationary*, but there are still many aspects of their performance *in moving railcars* that have not yet been verified. I have observed from my own field work that crusting agents and other topper sprays essentially break apart when a railcar gets shaken or bumped going over the track. Frequently other events can also occur to either upset the efficacy of the topper agent or in certain cases to make the fugitive loss even worse by a process known as "saltation," i.e., the greater entrainment of particles in a moving air stream as a result of released particles impacting the surface and therefore releasing yet greater amounts of dust. The performance of suppressants during precipitation events and long exposure to wind and solar radiation are also not that well-understood.

[1] "Revised Coal Dust Tariff" refers to item 100, entitled "Coal Dust Mitigation Requirements," as first published on July 14, 2011, in Revision 016 to BNSF's Price List 6041-B and subsequent revisions thereto.

f. Dr. Emmitt in his August 23, 2012, Reply V.S. states at page 2 that "topper agents are used in Canada, Australia, China and by Norfolk Southern in Virginia to control coal dust losses. To suggest that application of topper agents may not be an appropriate method to control dust on loaded coal cars is without merit." Dr. Emmitt has missed my point. Suppressants can possibly reduce fugitive emissions under certain circumstances, but that is not the central issue with the requirements of the BNSF Tariff. The question is whether and to what extent those circumstances exist for railcars in motion and to what extent, if possible, that those reductions can be measured and verified using the techniques that BNSF and SWA have attempted to use.

2. Background.

a. BNSF's Original Coal Dust Tariff[2] required that coal trains moving over the PRB Joint Line "emit not more than an Integrated Dust Value (IDV.2) of 300 units" and that coal trains moving over the Black Hills Subdivision "not emit more than an (IDV.2) of 245 units." According to BNSF's filings in Dust I, BNSF had collected IDV.2 data "from thousands of trains passing Milepost 90.7 on the Joint Line and Milepost 558 on the Black Hills Subdivisions"[3] and had prepared a statistical analysis of these data showing that "there is a high degree of confidence that coal dust emissions would be reduced by at least 85%" at the mandated IDV.2 emission cap levels.[4] BNSF also claimed that if shippers applied appropriate suppressants and profiled their trains, they could meet the mandated IDV.2 standards.[5]

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[2] "Original Coal Dust Tariff" refers to Item 100, entitled "Coal Dust Mitigation Requirements," initially published on April 29, 2009, in Revision 011 to BNSF's Price List 6041-B as amended through Revision 015 and Item 101, entitled "Coal Dust Requirements Black Hills Sub-Division," initially published on May 27, 2009, in Revision 012 to BNSF's Price List 6041-B, as subsequently amended.

[3] Dust I. BNSF Railway Company's Opening Evidence and Argument ("BNSF Dust I Opening") at 6.

[4] BNSF Dust I Opening, V.S. Sultana at 10.

[5] BNSF Dust I Opening. V.S. William Van Hook at 22: "We are confident that proper application of a quality surfactant onto a properly loaded coal car can reduce coal dust emissions from the rail car top by more than 85%."

b. In the Dust I case, I concluded that BNSF had not demonstrated that its IDV.2 calculations accurately measured fugitive coal emissions from moving coal railcars, or reductions in those emissions, if any, resulting from the application of suppressants. Reasons I cited for this conclusion included but were not limited to the following:

   i. BNSF attempted to collect coal dust emission data using MetOne E-Samplers on the Joint Line and on the Black Hills Subdivision, but BNSF failed to establish to a reasonable degree of engineering certainty that the E-Samplers accurately measure coal emissions, if any, from passing loaded coal railcars in a train.

   ii. BNSF failed to provide a reasoned explanation why its own studies of particulate measurements from E-Samplers located side-by-side in the field and in the laboratory produced substantially different IDV.2 results.

   iii. BNSF converted the E-Sampler output into IDV.2 values using a computer algorithm that it refused to produce, making it impossible to know how these values were being calculated and what they represented. BNSF's refusal to produce this computer algorithm was further exacerbated by the fact that the concept of "Integrated Dust Value" appears nowhere in the technical literature or regulations. In other words, the IDV concept is uniquely a creation of BNSF / SWA and has received no scrutiny or peer review from the appropriate technical community. This reality makes its meaning and applicability all the more suspect.

In its decision finding that BNSF's publication of the Original Coal Dust Tariff was an unreasonable practice, the Board stated that it "share[d]" many of these same concerns.[6]

c. BNSF published its Revised Coal Dust Tariff in July of 2011. This Tariff requires that PRB coal shippers "take measures to load coal in such a way that any loss in transit of coal dust from the shipper's loaded coal cars will be reduced by at least 85% as compared to loss in transit where no remedial measures have been taken." The Tariff further provides that "a shipper will be deemed to be in compliance" with the 85% reduction requirement if it profiles coal railcars in the same manner as was required under the Original Coal Dust Tariff and "properly" applies a BNSF-approved "topper agent" that has been shown to reduce coal dust loss in transit by 85%." The Revised Tariff, as originally published, also stated that "in recent tests carried out in the PRB, three topper agents meet this criteria when properly applied" and listed those agents in Appendix B to the Revised Tariff.

d. I was requested by WCTL in August of 2011 to review publicly available information concerning the "recent tests" referenced in the Revised Coal Dust Tariff. The "recent tests" BNSF was referencing was a study called the "Super Trial." In this series of tests, BNSF calculated IDV.2 values for 1,518 trains transported between March and September of 2010. Each of these trains had been treated with a specified coal dust suppression agent in either a body treatment or a topical treatment. A total of "seven different chemical agents" were used. In addition, "115 trains were tested using Passive Dust Collectors." BNSF explained its passive collector testing procedure as follows:[7]

> "On each of these 115 trains, half of the cars were treated with a coal dust suppression agent and the other half were untreated. Passive dust collectors were attached to the rear

[6] STB decision served March 3, 2011, at 13.

[7] Reference the publicly available document "Summary of BNSF/UP Super Trial 2010."

> sill of seven treated and seven untreated cars on each train. The coal dust collected from the passive dust collectors during the train's movement was then analyzed to compare the amount of coal dust emitted from the treated and untreated cars."

The IDV.2 study data as arranged by BNSF in its "Summary" of the study results purported to show that shippers could comply with the IDV.2 standards set forth in the Original Coal Dust Tariff by applying topical suppressants, a result that BNSF said was "confirmed" by its passive dust collector results. BNSF also asserted that its passive dust collector results showed that "three topical treatment agents showed coal dust reductions of 85 percent or more – AKJ CTS-100, Midwest Soil-Sement and Nalco Dustbind Plus." These three suppressants were those BNSF identified in the Revised Coal Dust Tariff as approved suppressants.

e. The results of my initial review of BNSF's results were set forth in my Verified Statement accompanying WCTL's petition, filed with the Board on August 11, 2011. I concluded, based on public information then available to me, that BNSF's attempt to measure fugitive emissions from coal cars using its passive dust collector study method was riddled with fundamental flaws and, just like its prior IDV.2 studies, did not produce scientifically meaningful calculations of fugitive emissions from railcars with certainty, reliability or repeatability.

f. I have now had the opportunity to review additional materials produced in discovery in this case concerning BNSF's Super Trial study and additional post Super Trial studies that BNSF has conducted. I have also reviewed BNSF's filing responding to WCTL's August 11, 2011, petition. Based on this review, I reaffirm here the conclusions I reached in my August 11, 2011, Verified Statement: BNSF's attempt to quantitatively measure fugitive emissions, whether in an absolute or relative manner, from coal railcars using its passive collector methods was riddled with fundamental flaws and, just like its prior IDV.2 studies, did not

produce scientifically meaningful calculations of fugitive emissions from railcars with certainty, reliability or repeatability.

3. **A fundamental flaw with the passive dust collectors is that they collect particulate matter within a certain size range based on the particular design parameters of the collectors. No testing, calculations or other engineering data have been produced by SWA or BNSF to establish with certainty what the so-called "cut point" is for the collectors. In fact, it's quite possible that they simply do not know.**

   a. The passive dust collectors, as designed by SWA and used by BNSF, are essentially metal boxes that have an inlet opening with a certain cross-sectional area that is connected to a vertical channel that is then connected to a removable box at the bottom of the vertical channel (see Figure 1). To facilitate air flow through the collector, the vertical channel is equipped with a "volute," which is essentially a circular opening in the side of the channel that is then covered by a mesh screen. A combination of the fluid dynamics properties of the air flow in the channel and volute along with the "blocking" provided by the mesh screen allow entrained particles smaller than a certain size to exit the collector while larger particles drop into the collector box. The "cut point" that determines which particles pass-through and which are collected is to a large extent established by the detailed design and wind-tunnel testing of the collector. SWA has claimed that they have performed extensive wind-tunnel studies on their passive collector design; however, SWA neither presented any significant results from any such claimed testing nor have they published the results from any such claimed studies in the relevant technical literature. Given this lack of information and ability to verify the design and setting of the collector's cut point, neither SWA nor BNSF have offered reasonable scientific or engineering data to establish exactly what entrained particles the collectors actually collect.

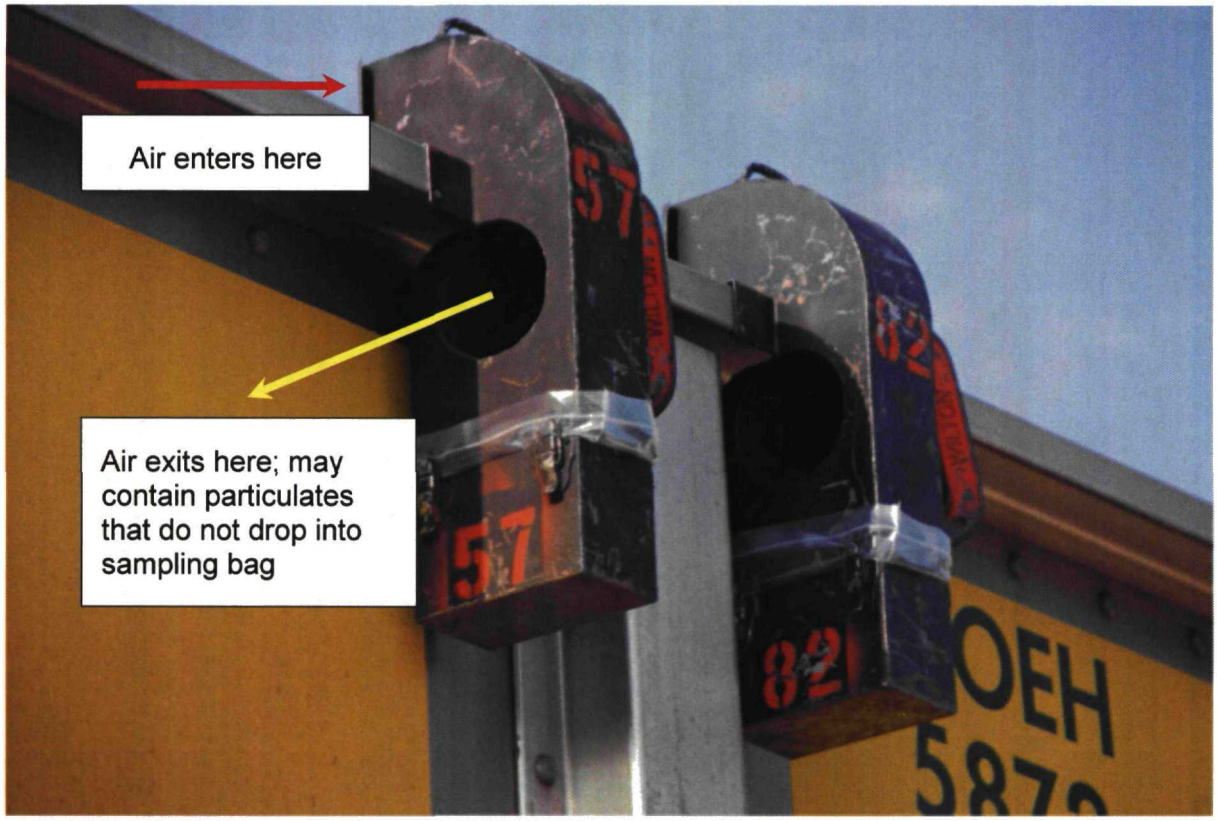


Figure 1.

b. In its response to WCTL's discovery requests, BNSF admits that its "passive collectors were not based upon a specified 'cut point' that distinguished between particles of different sizes"[8] but asserts that "analysis relating to a 'cut point' was not necessary because the passive collectors were designed to provide a relative measure of coal dust lost from rail cars in transit when they are attached to different rail cars to assess the effectiveness of different coal dust mitigation approaches."[9] However, BNSF's response begs the question as to whether the passive collectors retain the fugitive particles that allegedly cause the ballast fouling problems asserted by BNSF. It is self-evident that the passive collectors do not retain all of the particulate matter that enters them because the air that enters the collectors needs to exit the collectors (see arrows in Figure 1). But what range of particle size gets retained? If this reasoning were taken to its logical

[8] BNSF Railway Company's Responses and Objections to Coal Shippers' First Set of Interrogatories and Document Requests at 2, February 6, 2012 ("BNSF Feb. 6, 2012 Responses").

[9] Id.

conclusion that would mean that it would be possible to design the collectors with a high enough cut point such that most if not all entrained dust would then be able to pass through. Given this situation, it further would be logical to then conclude that no dust at all is emitted from moving railcars regardless if they are treated with a suppressant. It is well-established in the air sampling literature that sampling necessarily is associated with a particular range of particle size, whether it be PM10, PM2.5 or something else. Since BNSF / SWA have refused to address particle size issues at all in any of their work, this uncertainty remains with the passive collectors.

c. In addition to the ambiguity involved with the establishment of the cut point, the material that remains in the collector box can contain a whole variety of foreign, non-coal content such as insects, other organic matter, other airborne materials like pollen, etc. During the field testing that Exponent performed and that I directed (as mentioned in the **Introduction**), we experienced first-hand this phenomenon. We routinely found foreign matter such as insects and what appeared to be wood chips in the passive collector boxes that we used during our field testing. Exponent's understanding is that the passive collector samples taken during field testing performed by BNSF were also not checked for foreign content. This has been a concern regarding the use of the passive collector device as it will retain whatever is blown into it above a certain size. One solution to this clear problem is to perform a chemical or even simple visual / microscopic analysis of the materials found in each collector box. No evidence or data have been provided by BNSF or SWA to substantiate that the material they collected in each passive collector and then weighed to establish percentage dust reduction was actually all coal. BNSF claims that "large and obvious non-coal particles were removed before drying and weighing."[10] There are multiple problems with this approach to the disposal of suspected non-coal material found in the collectors:

[10] Id. at 3.

i. It introduces substantial bias into the already uncertain sampling approach because it relies upon a subjective norm to alter or reduce the collected sample (i.e., what one person in the field determines is "large and obvious" might not be the same as another person).

ii. It requires that the collected sample be manipulated in a manner that could significantly reduce (or potentially increase) the amount of material left in the sample bag. In some cases, the amount of material in the collector sample bag amounts to less than a gram ... roughly the mass equivalent of a small paper clip. In addition, this small amount of material would likely be present in the sample bag as a dust or fine granular material. Removing a large piece from the sample bag could easily change the total amount of remaining material in the bag to render its further use meaningless.

iii. Neither BNSF nor SWA appear to have created or disseminated a written protocol that establishes by what methods "large and obvious non-coal particles" should have been identified and removed.

d. Consider certain details from the technical literature that describe the use of passive collectors on tests of coal railcars in Europe: "All the dust collectors used in the four equipped wagons are of the same design, for the sake of comparison. Each wagon was equipped with a pair of dust collectors.... The lower part of each dust collector consists of a cylindrical container, where dust filters, previously weighted, were installed at the very beginning of the train run. At the end of the run, the weight of each filter was recorded, and qualitative analyses of the coal dust sample were conducted."[11] And from the same reference: "Due to the location of the flow sensors, specifically the proximity of the sensors to the wagon, it is expected that the measurements performed were influenced by the wagons and structures located upstream. Even so, since the flow erosion occurs

[11] Ferreira, A.D., Viegas, D.X. and Sousa, A.C.M., "Full-scale measurements for evaluation of coal dust release from train wagons with two different shelter covers," *J. Wind Eng. Ind. Aerodynamics*, v. 91, pp. 1271-1283, 2003.

through the top gap, the recorded information for the flow velocity and direction, near the top, is very important for the characterization of some parameters influencing the erosion process."

4. **Another fundamental flaw with the passive dust collectors is that no testing, calculations or other engineering data have been produced by SWA or BNSF to establish that the concentration of particulate matter in the entrained air flow "sampled" by the collector is the same as the concentration in the entire air flow over the top of the railcar so equipped. In addition, effects due to the collector geometry, dimensions and particle characteristics are not addressed by BNSF or SWA in any meaningful way.**

   a. Much like BNSF and SWA's failed efforts to show that the track-side E-Samplers are actually measuring something that is meaningful and able to be checked against a normative standard, this same general deficiency is present with the passive dust collectors. No evidence, wind tunnel test data, scale studies or calculations have been provided to establish that the entrained flow sampled by the passive collectors installed at certain locations on the top chord of the railcar is at all representative of the particulate concentrations found in the larger air flow currents over and around the entire railcar.

   b. A variety of citations in the relevant technical literature point to the importance of this very issue, sometimes referred to as "sampling efficiency." Consider the following excerpt: "There are many factors affecting the penetration efficiency, such as impaction, gravitational settling, and turbulent or laminar diffusion. After particles enter the sampling inlet, some particles are inevitably deposited on the internal walls by a combination of inertial impaction, gravitational deposition, diffusive deposition, and electrostatic deposition during transmission inside the sampling tube and the sampler. Such internal particle loss from the sampled air will lead to an effective reduction in the overall efficiency of sampling. The magnitude of this effect depends on the internal shape of the sampler, the

dimension of sampling tube, the sampling flow rate, and the physical properties of the particles."[12]

c. Consider another relevant excerpt from the technical literature: "Six sets of BSNE collectors [BSNE collectors operate on the same basic principle as a passive dust collector] were deployed at the windward and leeward positions in the field to measure saltation and suspension. One set of collectors consisted of five BSNE collectors mounted on a pole at heights of 0.1, 0.2, 0.5, 1, and 1.5 m. Two creep collectors were deployed at each field position to measure discharge to a height of 0.025 m. Sample collections were periodic due to the remoteness of the field sites and generally occurred immediately after a high-wind event. Sediment collected by BSNE and creep samplers was air-dried prior to weighing. For those events with sufficient sediment catch in the BSNE (more than 0.5 g), the sediment was separated into 10, 45, 100, and 150 μm diameter size fractions using a sonic sieve. Since the BSNE is inefficient in collecting all suspended sediment (Goossens and Offer, 2000), we ascertained the catch efficiency of the BSNE for suspended Ritzville silt loam sediment (particle size <125 μm) and PM10. Catch efficiency was determined in a wind tunnel by (1) placing a 50 mm extension on the front of a BSNE collector, (2) attaching a funnel to the top of the extension and (3) introducing a known amount of sediment or PM10 into the collector via the funnel. Catch efficiency was determined at wind speeds (measured using a pitot tube located adjacent to the opening of the BSNE collector) of 5, 10 and 18 m s^{-1} and computed as the ratio of mass of sediment or PM10 collected in the BSNE to the amount of sediment or PM10 introduced into the collector."[13]

d. In response to WCTL's discovery requests, BNSF states that it "is not aware of any 'testing, calculations, or other engineering data establishing that the

[12] Wang, X., Zhang, Y. and Tan, Z., "Comparison of different instruments for particle concentration measurements," *ASHRAE Trans., Part 2*, v. 111, pp. 467-475, 2005.

[13] Sharratt, B., Feng, G. and Wendling, L., "Loss of soil and PM10 from agricultural fields associated with high winds on the Columbia Plateau," *Earth Surf. Process. Landforms*, v. 32, pp. 621-630, 2007.

concentration of particulate matter in the entrained air flow sampled by the passive collectors was the same as the concentration in the entire air flow over the top of a rail car equipped with a passive collectors."[14] According to SWA's President, Dr. G. David Emmitt, "Dr. Viz's questions about 'sampling efficiency' and varying weather conditions might be worth considering if one were trying to predict the specific volume of coal dust that would be emitted from a train treated with a particular chemical binding agent but BNSF's objective was to determine whether a specific chemical could be expected to reduce coal dust losses by a certain percentage – 85%. Dr. Viz misunderstood, or ignored, BNSF's objective."[15]

e. To respond to Dr. Emmitt's assertion above, I neither "misunderstood" nor "ignored" BNSF's objective. Instead, I have relied upon the relevant technical literature and acceptable data reduction methods to support my conclusions, an approach that BNSF and SWA do not take. In response to Dr. Emmitt, reconsider the excerpt from Wang et al. just quoted above: "... After particles enter the sampling inlet, some particles are inevitably deposited on the internal walls by a combination of inertial impaction, gravitational deposition, diffusive deposition, and electrostatic deposition during transmission inside the sampling tube and the sampler. Such internal particle loss from the sampled air will lead to an effective reduction in the overall efficiency of sampling. [emphasis mine] The magnitude of this effect depends on the internal shape of the sampler, the dimension of sampling tube, the sampling flow rate, and the physical properties of the particles."[16] To calculate whether a "specific chemical could be expected to reduce coal dust losses by a certain percentage" as claimed by Dr. Emmitt, the total mass of material collected in each passive collector needs to be determined. If the collected mass were different from the total sampled mass for reasons such as those listed in Wang et al. (e.g., inertial impaction, gravitational deposition,

[14] BNSF Feb. 6, 2012 Responses at 3.

[15] STB Finance Docket No. 35305, BNSF Railway Company's Reply, V.S. Emmitt at 3-4, August 23, 2011 ("BNSF Aug. 23, 2011 Reply").

[16] Id. Wang et al.

diffusive deposition, electrostatic deposition, etc.), the calculated percentage difference between these two mass values would be different, but more importantly, incorrect. This point can be further illuminated by a simple example: Suppose the sampling efficiency of the passive collector is $X \pm 5\%$. If the mass of material collected in one sampling bag (from a collector on the treated portion of the train) is *1.00 g*, the actual mass could range from *0.95 g* to *1.05 g*. In a like manner, if the mass of material collected in one sampling bag (from a collector on the untreated portion of the train) is *2.00 g*, the actual mass could range from *1.90 g* to *2.10 g*. This would imply that the percentage reduction from the treated railcar compared to the untreated railcar could be anywhere from 44.7% to 54.8% – a significant range. So, to the contrary, Dr. Emmitt's conclusion that the sampling efficiency of the passive collectors, or how much internal particle loss occurs, is unnecessary "to determine whether a specific chemical could be expected to reduce coal dust losses by a certain percentage" is itself without merit, as the simple example presented above illustrates.

f. Regarding particle loss that occurs with the use of the passive collectors, Exponent found while performing the NCTA field studies that after the sampling bag was removed from the well of the passive collector, a significant amount of particulate material still remained attached or otherwise embedded in the structure of the collector. We used the technique of rapping the side of the collector body a few times before the sample bag was removed, but even then, additional rapping of the collector after the bag was removed produced a significant amount of particulates. For a total collected mass of just a few grams, the amount of material that could still be liberated from a collector after the sampling bag had been removed was occasionally significant and, based on our NCTA field studies, could easily double the total mass measurement or more.

5. Field test results from BNSF / SWA and tests performed independently by Exponent show that the total amount of material retained in the collector can vary widely from fractions of a gram to hundreds of grams. It is difficult, if not

impossible, to use a simple field measurement technique to establish a percentage reduction in particulate emissions when mass data from collector to collector can span 2 to 3 orders of magnitude in significant figures. Although in its response to Interrogatory No. 8 BNSF indicated that "more precise" measurements were taken in their lab, they have not provided any important details about how these measurements were taken. Given this lack of response, it is impossible to evaluate BNSF's claim that the lab measurements they performed were "more precise." Such details would provide critical information to be able to evaluate the validity of BNSF's sample collection and data reduction methods, but like the computer program BNSF and/or SWA use to compute IDV.2, this information has never been provided.

a. {

} Neither BNSF nor SWA have produced any detailed procedures as to what equipment was used to perform their field measurements of sample mass or whether their methods involved regular calibration traceable to a NIST standard. Without this basic information it is difficult, if not impossible, to establish any measure of repeatability or error in their measurements. Error estimates are extremely important when an attempt is made to establish a percentage reduction from one measurement to the next when the actual measured masses are each on the order of a gram or less.

b. In its Interrogatory No. 8, WCTL requested BNSF to describe the procedures it used to collect mass data from its passive collectors, including calibration traceable to a NIST standard and error measurements. In response, BNSF stated: "Field measurements were done with a weight-balance scale. However, field measurements were used only for purposes of preliminary and rough evaluation of

the results of dusting from a particular train movement. More precise measurements were performed by BNSF's Technical Research & Development (TR&D) Laboratory in a laboratory setting. The measurements done by BNSF's TR&D Laboratory were the basis for the test results that were used to evaluate the effectiveness of different topper agents."[17] Although in its response BNSF has indicated that "more precise" measurements were taken in their lab, they have not provided any important details about how these measurements were taken. Specifically, BNSF did not provide any information to WCTL's request for information regarding a description of the equipment used, whether the instruments were regularly calibrated to a NIST-traceable standard, the degree of precision associated with the measurements and an estimate of the measurement error. All of these parameters were explicitly requested in Interrogatory No. 8. Given the claimed importance that the passive collector measurements have in BNSF's fugitive dust mitigation program, it would seem reasonable and expected that this information would be available and supplied without hesitation. {

} In fact, an employee of BNSF did witness Exponent's static testing and sample handling / measurements during the Summer of 2008 at the AEP Cook Coal Terminal in Metropolis, Illinois.

6. **Passive dust collector handling, cleaning, installation and removal, sample removal and sample measurements all need to be performed in adherence to a well-defined, written protocol that all field personnel obey. No evidence has been produced by BNSF or SWA to substantiate that uniform procedures were in place and that they were being strictly followed.**

[17] BNSF Feb. 6, 2012 Responses at 3.

a. Field methods for measuring the mass of material samples from passive collectors should involve collection bag "blanking" and collector cleaning steps. Even then, sample mass measurements will still have variability. To my knowledge, neither BNSF nor SWA have ever produced any type of field procedure for sample handling and measurement nor has either performed any analysis to estimate variability associated with such measurements.

b. BNSF and/or SWA to our knowledge did not use certified-clean sample collection bags in the passive collectors used in field testing; the use of such collection bags constitutes good procedure. Such bags were used by Exponent in our field work. In our field work with passive collectors, each passive collector was equipped with a certified-clean, pre-weighed sample bag that once removed (performed inside a climate controlled structure) was measured two times for post-test mass gain and estimate of measurement repeatability.

c. No evidence has been produced to establish that either BNSF or SWA "conditioned" their material samples after they were removed from the collectors. "Conditioning" typically involves holding each sample for a fixed period of time in a controlled environment at a fixed temperature and relative humidity. In this manner sample mass variability attributed to moisture content can be normalized. In fact, no evidence has been provided to establish how BNSF / SWA accounted for moisture content in the passive collector samples. BNSF stated in its response to WCTL's discovery requests that "Once a train arrived to the rail yard for equipment removal, passive collectors were removed. The sampling bags were removed from the passive collectors, sealed and placed into a second sampling bag in case of spillage during shipping. All passive collector sampling bags were placed into a five-gallon bucket and shipped to BNSF's TR&D Laboratory for dry-weighted analysis."[18] However, neither BNSF nor SWA have provided any details as to what method was followed to establish "dry weights." In addition, it

[18] Id. at 3-4.

is not clear how a dry-weight analysis would be interpreted if the original moisture content of the coal was not determined from pre-departure sampling. Standardized methods do exist for the determination of the moisture content of a sample of coal, such as ASTM D3173, "Standard Test Method for Moisture in the Analysis Sample of Coal and Coke." However, neither BNSF nor SWA have provided any evidence that such consensus standards were referenced or followed.

d. It is my understanding that during BNSF-sponsored field testing from 2007 to 2009, field personnel were instructed to avoid applying passive dust collectors to railcars with "unusual loading profiles or unusual dimensions (height or capacity)." It is not clear if what constituted "unusual" was left to the discretion of the person involved in the field installation at the time. If an "unusual" profile or dimensions were observed, the field personnel were instructed to skip to the adjacent railcar or to apply the passive collectors to the most regular variety of railcar and coal profile seen in each particular consist.

e. {

} BNSF stated in response to WCTL's discovery

requests that "BNSF used RTEPS to determine the relative stressfulness of each rail trip test, including in particular whether any precipitation was experienced. RTEPS was not used to 'normalize' the passive collector data."[19]

f. It is not clear from any materials produced by BNSF if or how they or SWA quantitatively incorporate the "relative stressfulness" of each train trip into the method by which they analyze the sample mass measurements taken from the passive collectors. The use of "emission factors" that can be estimated from quantities such as the coal fines content, the mean local wind speed, train speed, the surface moisture content and more general weather data such as the number of dry days per month or per year in a specific region has been well-established in the technical literature for over 30 years.[20] In addition, the importance of including meteorological data in the general treatment of coal dust dispersion modeling and sampling has also been well-established.[21] Given the apparent complexity with which BNSF and SWA approached the analysis of E-Sampler data it is unclear why they did not attempt to normalize passive collector data by weather information.

   Dr. Emmitt acknowledges that SWA / BNSF did not have a "well-defined, written protocol that all field personnel obey"[22] but claims that such a protocol was unnecessary. {

[19] Id. at 4.

[20] Stein, D. and Crow, G., "Problems in calculating fugitive-dust emissions for coal-handling facilities and storage piles," *Environmental Progress*, v. 3, n. 1, pp. 33-40, February 1984.

[21] Howroyd, G.C., "Technical guide for estimating fugitive dust impacts from coal handling operations," US Department of Energy report no. DOE/RG/10312-1, September 1984.

[22] BNSF Aug. 23, 2011 Reply, V.S. Emmitt at 4.

[23] Reference BNSF_COAL DUST II_00553765.

} It is difficult to imagine how Dr. Emmitt could conclude that a protocol was unnecessary given the extent of the field operations, the handling of numerous passive collector samples by multiple individuals and the apparent desire to measure and reduce the data from the passive collectors reliably and in a repeatable manner.

7. **During the Super Trial tests performed by BNSF in 2010, only 115 trains out of a population of 1,633 were equipped with passive dust collectors, and only 14 railcars in each of these 115 trains were equipped with passive collectors. Given the numerous sources of variability already described and the lack of any error analysis, it is highly unlikely that BNSF or SWA could make any statistically**

[24] Id.

[25] Id.

significant inferences about percentage dust reductions from the 115-train set behavior to the entire population of trains tested.

a. According to Dr. Emmitt, "It is possible to make a valid statistical inference based on a very small number of samples in tests such as those carried out with passive collectors in the super trial, where the relative impact of the topper agent is based on results from several treated cars and several untreated cars on the same train and thus experiencing the same weather and the same trip stresses."[26] However, the question is not so much if a statistical inference can be made but rather to what degree is that inference significant. As has been detailed throughout this statement, there have been and continue to be numerous uncertainties associated with the data collected and analyzed from the passive collectors. The central issue is not so much whether a passive collector will collect and retain particulate matter (some of which might be coal), but rather whether the information from the collected samples can be reliably used with certainty. That the information derived from the passive collectors can be used to roughly indicate that coal is being episodically emitted from a train is not the primary issue. The primary issue – and problem – with the passive collectors is that neither BNSF nor SWA have presented sufficient information, engineering analysis or third-party validation testing to show with quantifiable certainty that their use of the passive collectors can *measure* fugitive coal emissions in either an absolute or relative sense.

b. Only 115 trains were involved in the BNSF Super Trial tests performed in 2010, and each train was only equipped with 14 passive collectors each: seven installed on the untreated half of the train and seven installed on the treated half of the train. In addition, seven different suppressant chemicals were applied, some as full body applications, some as topper sprays and two as both. {

[26] BNSF Aug. 23, 2011, Reply, V.S. Emmitt at 4.

} In performing testing of this nature, particularly when there is a huge number of test variables each with its own uncertainty, it is preferable to attempt to measure and/or otherwise quantify the uncertainties and to use as large a sample size as possible in order to be able to increase the statistical confidence associated with the testing results. In addition, because the 115 trains were used to attempt to evaluate the performance of seven different suppressants, in reality results from very few trains were used to determine the effectiveness of each suppressant.[27]

c. As BNSF commented in the publicly available document "Summary of BNSF/UP Super Trial 2010," "field audits of treated trains showed that there was at times significant variation in the quality and consistency of the physical application of topical treatments at the mines." Given all of the different testing variables in addition to the uncertainty that is associated with each one of these variables, it seems inconceivable that a sample of 115 trains out of 1,633, as well as a smaller sample size to evaluate the performance of individual suppressants, could be sufficient to render any quantitative judgment about the effectiveness of suppressants. On a more technical level, the fundamental error that BNSF and SWA continuously have made in analyzing the results of these tests is that they never measure, determine or attach realistic uncertainties or variability to the quantities they are attempting to measure. For example, produced materials that have been made available for my review refer to passive collector total mass samples as straight numbers, X. But as we have shown in this statement and others, each collector mass sample needs to be stated as $X \pm Y\%$ or in some similar manner. This approach should be taken for the other relevant variables as well.

---

[27] {

}

Under this approach, the uncertainty portions of these quantities would need to be dealt with in a quantitative and statistically reliable manner because it is not just a matter of statistical inference but also one of certainty. In other words it is not just a question of what can be statistically inferred from the collected data, but to what degree of certainty can those inferences be made. No evidence has ever been produced in these proceedings to address the measurable uncertainties that are involved in the quantitative inputs to these studies.

d. {

}

{

b)

}

8. Even with the uncertainties and unreliability involved in the use of passive collectors, {

}

a. While I do not endorse the BNSF passive collector testing for the reasons discussed herein, it is possible that a valid study of fugitive coal emissions from railcars could show that a combination of profiling and increased coal size significantly reduces fugitive emissions and that the additional application of suppressants does not produce significant additional reductions in those emissions.

b. {

}

c. {

[28] Reference BNSF_COALDUST_0038717-0038731.

}

9. BNSF's use of laser scanning or other technology to monitor or "verify" that the loaded top-of-car coal profile meets the precise requirements of BNSF's "bread loaf" railcar profiling requirements set forth in Appendix A to the Revised Coal Dust Tariff is inappropriate unless the laser profile measurement is made at or very near to the mine load-out location.

a. In my Opening V.S. (dated March 16, 2010) from the Dust I proceedings, I stated: "Furthermore, using laser scanning or other technology to monitor or 'verify' that the loaded top-of-car profile meets the precise requirements of BNSF's 'bread loaf' profile negates the reality that the profile will likely change shape and settle or become partially redistributed as each loaded railcar is exposed to train handling forces (e.g., buff, draft, slack action, possible emergency brake application) and vibrations that neither the mines nor the utilities can control." Top-of-car coal profiling appears to offer a significant benefit towards reducing fugitive coal dust emissions, but it is unfair and inappropriate to measure that profile once the railcar has experienced any significant handling or movement for the reasons noted above, i.e., train action and railcar vibration can cause the coal to settle or otherwise become redistributed in the railcar such that the original profile is no longer maintained.

[29] BNSF Dust I Op., Van Hook V.S., Exhibit 5 at 65.

[30] Id. at 68.

[31] Id. at 75.

10. By way of clarification, claims made by Dr. Emmitt in his V.S.[32] regarding the conclusions presented in the August 2009 Exponent final report to the NCTA are selectively referenced, incomplete and are quoted out of context. Dr. Emmitt's claims that the content of my August 11, 2011, V.S. is "contrary to the views he expressed in the prior Exponent report" are misquoted, incomplete and most importantly, incorrect.

a. In particular, in Dr. Emmitt's August 23, 2011, Reply, he cites a quotation from Exponent's August 2009 Report to the effect that it was possible that {

} From this premise, Dr. Emmitt claims that he is "surprised by the suggestion in [my] statement that the use of topper (or binding) agents on loaded coal cars may not be an effective way to address coal dust losses on moving coal cars."[34]

b. Dr. Emmitt has selectively quoted from my Report. In fact, my full statement emphasized that:

{

} [emphasis mine]

c. In addition, Dr. Emmitt asserts that Exponent's August 2009 Report {

}[36] In fact, Exponent's August 2009

[32] BNSF Aug. 23, 2011, Reply, V.S. Emmitt at 5.

[33] BNSF Aug. 23, 2011, Reply, V.S. Emmitt at 1-2 (citing NCTA Report at xiv).

[34] Id. at 1.

[35] Id. at xiv.

[36] BNSF Aug. 23, 2011, Reply, V.S. Emmitt at 5.

Report emphasized that {

}[37]

d. In addition, the Exponent August 2009 report also stated the following: {

}[38]

e. Finally, the Exponent August 2009 report also stated: {

[37] NCTA Report, August 2009, at xv.

[38] Id. at 124.

}[39]

f. Contrary to Dr. Emmitt's claims, {

} Moreover, this case involves studies and analyses *that BNSF says it relied upon* in developing its Revised Coal Dust standards, not the studies that Exponent performed in 2009. A primary issue is whether the passive collectors can be used as a *measurement of fugitive coal loss from a specific moving source*, and based on BNSF and SWA's work presented in these proceedings, they cannot. The BNSF passive collector studies at issue in this case are significantly flawed for the reasons discussed above.

11. The factors that determine if, when and to what extent fugitive emissions will occur in the transportation of loaded railcars were addressed in my Dust I Reply V.S. at 9-10. A review of the relevant technical literature clearly indicates that factors such as train speed (and therefore the resultant speed of the air over the top of loaded railcars when combined with local wind speed), train operation dynamics, weather and the properties of the coal itself are among the significant factors that determine if fugitive emissions will occur, when and to what extent. BNSF, in a variety of documents that they have either created or referenced, acknowledge the same factors.

a. One of the more relevant citations from the open literature includes: "The key factor that contributes to the emission rate of coal dust from wagons is the speed

[39] Id. at 157-158.

of the air passing over the coal surface. This is influenced by the train speed and the ambient wind speed. Other factors that are also found to contribute include: coal properties such as dustiness, moisture content and particle size; frequency of train movements; vibration of the [railcars]; profile of the coal load; transport distance; exposure to wind; and precipitation."[40,41,42]

b. Also consider the following citations all of which identify resultant wind speed over the top of loaded railcars as a significant causal factor: Ferreira and Vaz[43]; Leeder, Hutny and Price[44]; Noble, Sundberg and Bayard[45]; and Ferreira, Viegas and Sousa.[46]

{

[40] Interim Report issued by Connell Hatch for Queensland Rail titled, Environmental evaluation of fugitive coal dust emissions from coal trains, Goonyella, Blackwater and Moura Coal Rail Systems, Queensland Rail Limited, report no. H-327578, January 31, 2008.

[41] Draft Report issued by Connell Hatch for Queensland Rail titled, *Coal loss literature review, Coal loss management project, Queensland Rail Limited*, report no. H-327578-N00-CF00, January 11, 2008.

[42] Report issued by Simtars (a business unit of the Queensland government Department of Mines and Energy) titled. *Gladstone Airborne Coal Dust Monitoring: Complete Report for QR National*, report no. oe101776f3, January 18, 2008.

[43] A.D. Ferreira and P.A. Vaz, *Wind tunnel study of coal dust release from train wagons*, Journal of Wind Engineering and Industrial Aerodynamics, v. 92, 2004, pp. 565-577.

[44] R. Leeder, W. Hutny and J. Price, Train transportation coal losses – a wind tunnel study, Proceedings of the Iron and Steel Technology Conference, v. 1, 2007, pp. 129-138.

[45] G. Noble, S.E. Sundberg and M. Bayard, *Coal particulate emissions from rail cars*, Proceedings from the Air Pollution Control Association Specialty Conference on Fugitive Dust Issues in the Coal Use Cycle, rep. no. CONF-8304206, April 1983. pp. 82-92.

[46] A.D. Ferreira, D.X. Viegas and A.C.M. Sousa, *Full-scale measurements for evaluation of coal dust release from train wagons with two different shelter covers*, Journal of Wind Engineering and Industrial Aerodynamics, v. 91, 2003, pp. 1271-1283.

[47] BNSF March 15. 2010, V.S. Sultana at 5-6.

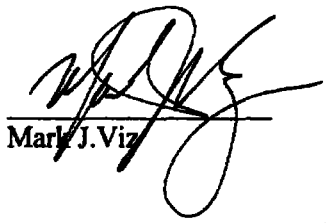
[48] Reference BNSF presentation { } BNSF_COALDUST_0079702-0079717 at 24, 25 and 29.

d.

} factors such as train speed, train operation dynamics, weather and the properties of the coal itself are among the significant factors that determine if fugitive emissions will occur, when and to what extent.

VERIFICATION

I, Mark J. Viz, Ph.D., P.E., verify under penalty of perjury that I have read the foregoing Verified Statement and know the contents thereof; and that the same are true and correct. Further, I certify that I am qualified and authorized to file this statement.



Mark J. Viz

Executed on: October 1, 2012

Exhibit MJV-1

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Mark J. Viz, Ph.D., P.E.
Principal Engineer

Professional Profile

Dr. Mark J. Viz is a Principal Engineer in Exponent's Mechanical Engineering practice. He specializes in performance evaluation and mechanical analysis of railcar and aircraft structures. He also specializes in risk, reliability, and mechanical integrity assessments of a variety of process plant equipment such as pressure vessels and tanks, and certain types of transportation vessels including railcar tanks, intermodal vehicles, and over-the-road tank trailers. Dr. Viz also has experience in component life reliability assessments, "repair or replace" risk decisions, and statistical analysis of in-service component performance. Other areas of Dr. Viz's specific academic expertise include nonlinear finite element analysis, metal and composite material testing, fatigue and fracture mechanics, and statistical data reduction methods. He has investigated and/or consulted in matters involving railcar derailments, tank car ruptures, releases of hazardous materials in transportation, coal mining haulage accidents, rotor failures, bus rollovers, pressure vessel explosions, and other industrial accidents.

Given his expertise in engineering mechanics, Dr. Viz also performs engineering evaluations and analyses involving the mechanical performance of a variety of machines and products. Some of these devices include elements of cranes and lifting devices (e.g., wire rope failures, hydraulic and valve failures), elements of elevators, a variety of industrial machines (e.g., printing equipment, CNC machine tools, pumps, compressors), certain aspects of machine guarding and lock-out/tag-out procedures, and specialized evaluations of consumer products. Dr. Viz's involvement in these types of cases typically involves the synthesis and execution of a variety of engineering mechanics calculations and analyses.

Prior to joining Exponent, Dr. Viz was a Product Development Engineer at the GATX Rail Corporation. His responsibilities included new rail car design and development, budget and schedule management, and sales and marketing support. Dr. Viz was also heavily involved in the regulatory environment concerning the transportation of hazardous materials in rail tank cars. Dr. Viz also served as a Specialist Engineer in the Structural Damage Technology group at the Boeing Company. He was responsible for the durability and damage tolerance analysis and testing of a wide variety of aircraft structures from wing and fuselage sections to individual fasteners. He has also taught probability, statistics, and mechanics of materials at the college level.

Academic Credentials and Professional Honors

Ph.D., Cornell University, Theoretical and Applied Mechanics, 1996
B.S., Massachusetts Institute of Technology, Aeronautics and Astronautics, 1990

Licenses and Certifications

Licensed Professional Engineer, Illinois, #062.062247
Mining Safety and Health Administration (MSHA) Part 46 and Part 48 trained
Respirator and SCBA fit-tested and trained

Publications and Presentations

Viz MJ. Failure analysis in the design cycle. Presented as a guest lecture for CIV-ENG 395-0 Engineering Forensics course, Evanston, IL, April 16, 2008.

Viz MJ, Momsen RH. Reliability and risk management of railcar truck castings in high mileage, high gross rail load service: A case study. Presented at the Annual Meeting of the Society for Risk Analysis, Baltimore, MD, December 5, 2006.

Morrison III DR, Ogle RA, Viz MJ, Carpenter AR, Su YS. Investigating chemical process accidents: Examples of good practices. Process Safety Progress 2006; 25:71–77, March.

Ogle RA, Morrison III DR, Viz MJ. Emergency response to a non-collision HAZMAT release from a railcar. Process Safety Progress 2005; 24:81–85. June.

Morrison III DR, Ogle RA, Viz MJ, Carpenter AR, Su YS. Investigating chemical process accidents: Examples of good practices. Presented at the Process Plant Safety Symposium. 2005 Spring National Meeting, American Institute of Chemical Engineers. Atlanta, GA, April 11–13, 2005.

Zehnder AT, Viz MJ. Fracture mechanics of thin plates and shells under combined membrane, bending, and twisting loads. Applied Mechanics Reviews 2005; 58:37–48, January.

Ogle RA, Viz MJ, Morrison III DR, Carpenter AR. Bulk transportation of hazardous materials by rail: Lessons learned from non-collision accidents. Presented at the 2004 Annual Symposium, Mary Kay O'Connor Process Safety Center, Texas A&M University, College Station, TX, October 2004.

Ogle RA, Morrison III DR, Viz MJ. Emergency response to a non-collision HAZMAT release from a railcar. Presented at the 19th Annual CCPS International Conference, Emergency Planning: Preparedness, Prevention and Response, American Institute of Chemical Engineers, Orlando, FL, June 2004.

Ogle RA, Viz MJ, Carpenter AR. Lessons learned from HAZMAT accident investigations. Presented at the 17th Annual AAR/BOE Hazardous Materials Seminar, Association of American Railroads/Bureau of Explosives, Houston, TX, May 2004.

Zehnder AT, Potdar YK, Viz MJ. Fatigue fracture in plates in tension and out-of-plane shear. Fatigue and Fracture of Engineering Materials and Structures 2000; 23:403–415.

Viz MJ. Fatigue fracture of 2024-T3 aluminum plates under in-plane symmetric and out-of-plane anti-symmetric mixed-mode deformations. Ph.D. Dissertation, Cornell University, 1996.

Potyondy DO, Viz MJ, Zehnder AT. Rankin CC, Riks E. Computation of membrane and bending stress intensity factors for thin cracked plates. International Journal of Fracture 1995: 72:21–38.

Viz MJ, Zehnder AT, Bamford JD. Fatigue fracture of thin plates under tensile and transverse shear stresses. Fracture Mechanics, 26th Volume. ASTM STP 1256, Reuter WG, Underwood JH, and Newman JC (eds), American Society for Testing and Materials, pp. 631–651, 1995.

Viz MJ, Zehnder AT. Fatigue crack growth in 2024-T3 aluminum under tensile and transverse shear stresses. Proceedings, FAA/NASA International Symposium on Advanced Structural Integrity Methods for Airframe Durability and Damage Tolerance. NASA CP-3271, pp. 891–910, 1992

Viz MJ, Zehnder AT, Ingraffea AR. Fatigue fracture in thin plates subjected to tensile and shearing loads: Crack tip fields, j integral and preliminary experimental results. Proceedings, 7th International Congress on Experimental Mechanics, Society of Experimental Mechanics; 1992: 44–50.

Prior Experience

Director of Applied Mechanics, Packer Engineering, 2001–2003
Product Development Engineer, GATX Rail, 1999–2001
Specialist Engineer – Structural Damage Tolerance, Boeing, 1997–1999

Project Experience

Directed, managed, and performed numerous rail tank car failure cause and origin investigations, most involving the release of hazardous materials. Projects typically involve extensive field investigations, including confined space entry of tank cars, mechanical and metallurgical analysis, mechanical integrity assessments, non-destructive examination, and sample collection.

Managed and performed numerous rail tank car loading and unloading incident investigations, often involving worker injuries or fatalities.

Investigated the unintentional uncoupling of mining service cars in a Virginia underground coal mine. The uncoupling resulted in a runaway car situation that lead to the fatalities of two miners. Project work included incident modeling and reconstruction, performance calculations, and inspections.

Actively directing a lengthy study involving the investigation of railroad track ballast fouling and coal dust mitigation evaluations for coal transport out of the Powder River Basin in Wyoming. Project work includes measurement of fugitive dust emissions, static and dynamic

(over-the-road) monitoring of dust loss from railcars, cost analysis for proposed mitigation techniques, and analysis of health and safety issues.

Managed and performed projects for multiple clients involving the mechanical integrity assessment and fitness-for-service evaluations of railcar truck castings (bolsters and side frames). These projects have typically involved the development and implementation of non-destructive examination procedures for both on-car and off-car examination, cyclic fatigue testing, mechanical and metallurgical testing, engineering evaluation of test results with respect to mechanical performance, and development of engineering plans to manage fleet components over the projected remaining useful service life. Have presented findings to the Association of American Railroads (AAR) for multiple clients.

Performed risk, reliability, and mechanical integrity assessments for a variety of process plant equipment including piping and tanks. Select assignments have involved flash train tanks at a bauxite to alumina processing plant, piping and vessels at a district cooling ammonia refrigeration plant, liquid carbon dioxide storage tanks, baghouse equipment at cement kilns, and a variety of other equipment subject to OSHA PSM (process safety management) and EPA RMP (risk management plan) regulations.

Directed, managed, and performed numerous incidents involving the release of hazardous materials from transportation vessels, including rail tank cars, intermodal containers, and over-the-road tank trailers. Projects typically have involved extensive field investigations, including confined space entry of tank cars, mechanical and metallurgical analysis, mechanical integrity assessments, non-destructive examination, and sample collection.

Performed design evaluation and risk assessment of a manufacturer's new product offering that provides GPS location and condition monitoring of railcars while in-transit. System includes remote sensing, GPS and satellite uplink equipment, all packaged in a field-hardened package. Project work included FMEA (failure modes and effects analysis), reliability modeling, and predictions for warranty structuring and material compatibility analyses.

Performed mechanical performance and stress analysis calculations for a fleet of coal railcars that exhibited top chord and side sheet buckling failures. The project involved performing detailed field inspections of the damaged railcars, finite element analysis (FEA) of the cars, and a determination of the in-service loads that were needed to produce the exhibited damage.

Managed and performed a collision damage assessment and engineering repair oversight for a major accident involving a monorail train in the Pacific northwest. Project work included responsibility for oversight of repair plans, mechanical contractor selection and qualification review, quality assurance oversight, schedule analysis, and general technical consulting. Project involved extensive field work and multiple presentations to technical staff and insurance adjusters.

Performed numerous mechanical performance analyses/evaluations for a variety of machines and products including:

- Manufacturing machinery (printing and binding equipment, forming and cutting machines, product conveying equipment, certain types of CNC machine tools)
- Elements of machine guarding and lock-out/tag-out procedures (drum foamers, printing and binding equipment, packaging equipment)
- Elements of crane and lifting devices (e.g., scissor lifts), including wire rope failures, hydraulic cylinder failures, holding valve failures, and stability issues
- Elements of consumer product performance including structural performance and mechanical response.

Academic Appointments

- Adjunct Professor, Mathematics Department, Pierce College, WA

Professional Affiliations

- American Society of Mechanical Engineers—ASME (member)
- American Institute of Aeronautics and Astronautics—AIAA (member)
- Society for Risk Analysis—SRA (member)

Barbaro

BEFORE THE
SURFACE TRANSPORTATION BOARD

REASONABLENESS OF BNSF RAILWAY COMPANY COAL DUST MITIGATION TARIFF PROVISIONS	)	Finance Docket No. 35557

VERIFIED STATEMENT OF
DR. RALPH W. BARBARO

My name is Dr. Ralph W. Barbaro. I am the President of Energy Research Company ("ERC") and a former Principal of Energy Ventures Analysis ("EVA"). I am submitting this verified statement on behalf of the Western Coal Traffic League ("WCTL"), American Public Power Association ("APPA"), Edison Electric Institute ("EEI") and the National Rural Electric Cooperative Association ("NRECA") (collectively "Coal Shippers"). A copy of my curriculum vitae is attached hereto as Exhibit RWB-1.

I hold Bachelor of Science, Master of Science and Ph.D. degrees in Mining Engineering and Operations Research from Pennsylvania State University. I have been working in the coal and energy industries for the past 35 years, and am a Registered Professional Engineer. I have experience working on coal-related projects related to all of the major coal producing regions in the country, including the Powder River Basin ("PRB"). During my career as a consultant in the energy industry, I have performed numerous coal industry studies and analyses including supply studies, transportation analysis, coal mine valuation, due diligence reviews, strategic planning, performance and

reserve studies, market analysis, forecasting, coal procurement and bid evaluation, and coal suitability analysis. In addition, I have experience in other areas related to the energy industry, including natural gas supply and transportation issues, electricity generation cost analysis, dispatch analysis, power transmission issues, and environmental issues.

From 1980 to 1986, I was an instructor at Penn State in the Mining Engineering Department, teaching undergraduate and graduate courses and performing research on coal reserve estimation, production analysis techniques, and mine cost analysis. From 1976 to 1980, I worked for the North American Coal Company at the Helen Mine in Pennsylvania.

Coal Shippers have requested that I present testimony regarding the size of coal produced by Powder River Basin ("PRB") mines. Coal producers have the ability to regulate the size of the product that they load into railcars for delivery to shippers. This coal size is expressed in terms of the diameter of the largest pieces of coal in a given sample and is determined based upon the ability of the coal to pass through a given sieve size. Coal that is classified as 2" coal is coal that has been crushed to the point at which all pieces can pass through a 2" sieve. Coal that is classified as 3" coal, on the other hand, is coal that has been crushed only to the point at which all pieces can pass through a 3" sieve. Coal at the 3" size obviously requires less crushing by the producer than coal at the 2" size.

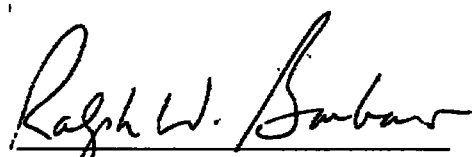
Traditionally, PRB coal was crushed to 2". However, to address railroad concerns about coal dust emissions from their trains, PRB coal suppliers have been

working with their customers to increase the standard PRB coal size from 2" to 3". This effort has been successful. Today, the current standard practice today is to crush PRB coal to 3".

Adjusting coal size is very straightforward for a PRB producer. Rather than having to replace existing equipment or to redesign their facilities in some manner, coal producers are able to adjust the size of the product that they deliver simply by adjusting a setting on their crusher equipment. This type of change is inexpensive and is not labor intensive.

VERIFICATION

I, Ralph W. Barbaro, Ph.D., verify under penalty of perjury that I have read the foregoing Verified Statement and know the contents thereof; and that the same are true and correct. Further, I certify that I am qualified and authorized to file this statement.



Ralph W. Barbaro

Executed on: September 27, 2012

Exhibit RWB-1

CURRICULUM VITAE
DR. RALPH WESLEY BARBARO, Ph.D., P.E.

CONTACT INFORMATION

Work address:	Energy Research Company LLC 13515 Hunting Hill Way North Potomac, MD 20878
Telephone numbers:	866-807-0191 (office) 866-807-0192 (fax) 301-807-6654 (cell)
Email:	ralph.barbaro@energyresearchco.com

EDUCATION

Years	Degree	School and Major
1981-1986	Dual Ph.D.	The Pennsylvania State University; Ph.D. degree in Mining Engineering and Operations Research. Thesis title: "Uncertainty and Risks of Reserve Estimation for Coal Quantity and Quality". (GPA: 3.92/4.0)
1980-1981	Dual M.S.	The Pennsylvania State University; Mining Engineering and Operations Research. Thesis title: "An Application of Mixed Integer Programming to the Optimal Siting and Production Scheduling for a Centralized Coal Preparation Plant". (GPA: 3.87/4.0)
1975-1980	B.S.	The Pennsylvania State University; Mining Engineering with Highest Distinction (GPA: 3.87/4.0)

PROFESSIONAL EXPERIENCE

Energy Research Company, LLC

President 2010-Current

Provide consulting services to energy companies, utilities, and other firms in numerous areas including:

- Coal markets studies and forecasting (national and regional)
  - Coal prices
  - Supply
  - Demand
- Coal mine analysis
  - Acquisition analysis/due-diligence
  - Financial/cost analysis (pro forma models)
  - Valuation analysis using DCF, comparables, and replacement costs
  - Mining conditions assessment
  - Management/operational review
  - Performance and benchmarking studies
  - Reserve analysis
- Coal transportation analysis
  - Rail
  - Barge

  - Truck
  - Conveyor
  - Transloading
  - Ocean vessels
- Coal contracting, procurement and administration
- Coal royalty/lease negotiations
- Coal contracts
  - Bidding and procurement
  - Bid evaluation
  - Due-diligence of potential suppliers
  - Escalation
  - Government Imposition evaluation and due-diligence
- Electricity markets
  - Wholesale electricity price forecasts
  - Retail electricity price forecast
  - Electricity demand forecast
  - Electricity capacity and generation forecasts
  - Power plant financial/cost analysis (pro forma models)
- Escalation forecasting
  - BLS energy related indicies
  - Labor costs
  - Coal production unit costs
  - Transportation units costs

Energy Ventures Analysis, Inc.

Principal	1989-2010
Associate	1986-1989

Provided consulting services to energy companies, utilities, and other firms in numerous areas including:

Energy and Electricity Supply/Demand/Price Forecasting

- Analyzed the electric utility, coal and natural gas industries for supply, demand and price forecasting of fossil fuels and electricity.
- Analyzed and forecasted the international coking and steam coal markets, prices, supply, exchange rates, shipping rates, etc.
- Developed and maintained computer models that analyze the generating capacity, output, delivered cost of fossil fuels, variable generation cost, and marginal generation cost for every power plant in the U.S.
- Forecasted load duration curves and price duration curves of wholesale electricity for all of the NERC regions and subregions.
- Tracked, analyzed and forecasted FOB mine, transportation and delivered coal prices
- Tracked, analyzed and forecasted wellhead, pipeline and delivered gas prices.
- Tracked changes in economics and technology of various generating technologies.
- Tracked and analyzed impact of environmental regulations on the energy industry.

Coal Supply Studies

Performed coal supply studies on coal supply and demand for all of the major U.S. producing regions including Northern Appalachia, Central Appalachia, Illinois Basin, Powder River Basin, and Western Bituminous

Coal Transportation Analysis

Performed transportation analysis including capital and operating costs, existing and future capacity, regulations, AAR indicies, market issues, etc. for various modes of transportation:

- Rail
- Barge
- Trucking
- Conveyors
- Transloading
- Ocean ships

Coal Mine Valuation, Due Diligence, Performance And Reserve Studies

Performed financial, discounted cash flow analysis, and/or operating performance evaluation of numerous coal companies, mines, and coal reserves.

Coal Contract Government Imposition and Force Majeure Analysis

Performed numerous reviews of government imposition and force majeure claims to verify their validity and the amount claimed.

Coal Market Analysis

Performed numerous coal market studies for all major U.S. coal supply regions including Northern Appalachia, Central Appalachia, Illinois Basin, and Western Bituminous, and for utility, metallurgical, industrial and export markets.

Economic and Cost Indices Forecasting

Performed forecasts of various economic parameters, such as GNP, inflation, RCAF, labor, material and supplies, fuel, power, medical, and other costs. Also, forecasted various BLS indices for several utilities.

Coal/Natural Gas Procurement And Contracting

Provided support to utilities in coal/natural gas procurement and contracting including preparing the contract terms and conditions for the bid solicitation, identifying likely suppliers, evaluating bids responses, evaluating the suppliers ability to meet the contract terms (mine audits), reviewing final contract terms, etc. for numerous utilities. Also assisted in several fuel supply audits.

Royalty Audits/Lease Negotiations

Performed audits of royalty payments including review of the sales price and volume calculations. Negotiated the terms and conditions of a coal lease. Reviewed many coal lease agreements as part of utility/mine audits of coal mines.

Litigation Support

Provided expert testimony and litigation support work for numerous arbitration and litigation proceedings.

The Pennsylvania State University
Instructor, Mineral Engineering Department 1981-1986
Graduate Assistant 1980-1981

Courses Taught
Taught or assisted several undergraduate and graduate courses including mine property valuation, mine cost analysis, mine operations analysis, mine system engineering, survey, ventilation.

Research
Performed various research on geostatistical reserve analysis applications to coal, variability of coal quality, statistical variation of coal washability characteristics, coal blending optimization models, mine production simulation models, queueing theory techniques to shovel-truck material haulage systems, etc.

North American Coal Corporation
Mining Engineering Department (1978-1979)
Worked a year in the engineering department at the Helen Mining Company in Homer City, PA, a one million tpy captive mine to the Homer City power plant. Prepared daily production and monthly royalty reports, and semi-annual ventilation and subsidence maps; assisted in preparation of mine plans and projections; performed both underground and surface surveying for property control, locating existing gas wells, and for siting a ventilation shaft; assisted supervision of 16 exploratory drill holes and the construction of a 15-foot-diameter raised-bored ventilation shaft; prepared permit to mine within 150 feet of a gas well; operated and maintained the mine sewerage treatment plant, etc.

Underground UMWA Laborer (1976-1977)
Worked a year in the UMWA as a miner helper, roof bolter helper, shuttle car operator, mechanics helper, supply man, belt man, brattice man and general laborer. Attended a special one-month training program, which covered mine machine operation, roof support, ventilation, health and safety, first aid, mine rescue, and general coal mining techniques.

PUBLICATIONS
Authored or co-authored papers that have been published in professional magazines and symposia including Coal Age, Mining Engineering, Application of Computers and Operations Research to the Mineral Industry, and Use of Computers in the Coal Industry. Has been quoted in national publications including Wall Street Journal, Forbes, Journal of Commerce, Power Market Week, etc.

PROFESSIONAL ACTIVITIES

- Society of Mining Engineering of AIME, 1977-present
- Mining and Exploration Division - Operations Research Section for the SME-AIME
    - Scholarship Committee, 2001-03.
    - Executive Committee, 1988-89.
    - Program Chairman, 1987.
    - Program Planning, 1986.
    - Publications Chairman, 1985.
- Mining & Exploration Division's 1986 Peele Award Committee.
- President of Penn State's Student Chapter of SME-AIME, 1979-80.
- Washington D.C. AIME, 1986-present
- Operations Research Society, 1985-present

CERTIFICATIONS

- Registered Professional Engineer, PE-034293-E, 1985
- MSHA Instructor, 1982
- Mine Machine Operators School, 1976
- First Aid Training, 1976

AWARDS AND HONORS

- Centennial Fellow, College of Earth and Mineral Science, The Pennsylvania State University, 1996
- Best Student Paper - Graduate Division, Society of Mining Engineers, 1982
- Old Timers' Gold Watch Award (Outstanding Graduating Senior), The Pennsylvania State University, 1980
- First Place in the Health and Safety Contest, 1979
- Phi Kappa Phi Honor Society, 1979
- Alpha Lambda Delta Honor Society, 1976

ACADEMIC SCHOLARSHIPS AND FELLOWSHIPS

- Centennial Fellow, Earth & Mineral Science College, The Pennsylvania State University, 1996
- Mining and Mineral and Mineral Fuels Conservation Fellowship, 1980-81
- North American Coal Corporation Scholarship, 1979-80
- Donald MacIntire Scholarship, 1979-80
- Class of 1922 Scholarship, 1978
- Bayard D. Kunkle Scholarship, 1977-80
- Edwin L. Drake Memorial Scholarship, 1977-80
- Consolidation Coal Company Scholarship, 1975-77

COAL MINES EVALUATED/INSPECTED

Northern Appalachia

- AEP
  - Meigs 2 (OH)
  - Meigs 31 (OH)
  - Muskingum (OH)
  - Windsor (WV)
  - Martinka (WV)
- Alpha
  - Cumberland (PA)
  - Emerald (PA)
  - Nolo (PA)
  - Ondo (PA)
- Arch
  - Monongalia Strips (WV)
  - Sentenial (WV)
  - Spruce #1 (WV)
  - Spruce #2 (WV)
- Barnes and Tucker
  - 24B (PA)
  - Rushton
- Bethlehem
  - Fawn (PA)
- C&K Coal (PA)
- CONSOL
  - Bailey (PA)
  - Blacksville (PA)
  - Mine 84 (PA)
  - Quarto 4 (OH)
  - Pocahontas Div (VA)
- Helen Mining (PA)
- Murray Energy
  - Burrell (PA)
  - Canterbury/Diane (PA)
  - High Quality (PA)
  - Powhatan 6 (OH)
- Parkwood Resources (PA)
  - Cherry Tree (PA)
  - Genesis #17 (PA)
  - Parkwood (PA)
- Peabody
  - Federal #2
- R&P Coal
  - Emilie (PA)
  - Keystone (PA)
  - Florence (PA)
  - Robinson Run (PA)
- Rhino
  - Harrison (OH)
- Rosebud
  - Clementine (PA)
  - Josephine (PA)
  - Logansport (PA)
  - Stitt (PA)
  - Tracy Lynne (PA)

Central/Southern Appalachia

- Addington/Job 17 (KY)
- Alpha (WV, KY)
  - Cumberland Resources (KY/VA)
  - Delbarton (WV)
  - Elk Run (WV)
  - Logan County (WV)
  - Marfork (WV)
  - Marrowbone (WV)
  - Martin County (KY)
  - Omar (WV)
  - Peerless Eagle (WV)
  - Rawl (WV/KY)
  - Sidney (KY)
- Amvest
  - Powell Mountain (VA)
- Appolo Fuels (KY)
  - Appolo Prep (KY)
  - Hignite Strip/HWM (KY)
  - Jellico North (TN)
  - Low Splint – Wilco #2 (KY)
  - Poplar Lick Strip/HWM (KY)
  - Rich Mtn Strip/HWM (TN)
- Arch
  - Cumberland River (KY)
  - Dal-Tex (WV)
  - Samples (WV)
  - Ruffner (WV)
  - Lone Mountain (VA)
  - Lynch (KY)
- Black Diamond (KY)
  - Ivel Prep (KY)
  - Ivyton Strip (KY)
  - King Hamilton 2 (KY)
  - Martin Prep (KY)
  - Mitec 1 (KY)
  - Prater 2 (KY)
  - Prater 3 (KY)
  - Risner 3 Williams (KY)
  - RV-Margaret Fork (KY)
  - S&B Energy-Gunstock (KY)
  - Spurlock Prep (KY)
  - Turkey CreKY #2 (KY)
- Blue Gem (KY)
  - Bain Branch (KY)
  - Blue Gem #1 (KY)
  - D&R #1 (KY)
  - Harps Creek (KY)
  - Log Cabin (KY)
- Bluestone
  - Dynamic (WV)
  - Mine 65 (WV)
- Broken Ridge LLC (KY)
- Clearwater/Miller Bros (KY)
  - Combs Branch (KY)
  - Baker (KY)
  - Joes Branch (KY)
  - Panther (KY)
  - Trap Branch (KY)
  - Risner #2 (KY)
- CONSOL
  - Mill Fork (KY)
  - Millers Creek (WV)
- Costain
  - Prater Creek/Chaparral (KY)
- Cumberland Resources
  - Cloverlick (KY)
  - Panther #1 (KY)
  - North Fork #4 (KY)
  - Stillhouse (KY)
  - Nally & Hamilton (KY)
  - Bluff Spur (VA)
  - Dorchester #4 (VA)
- Dixie Fuels (KY)
- Eastern Associated
- Eastern Fuels (KY)
  - Coal Ridge (KY)
  - Goose Creek #1 (KY)
  - Goose Creek #2 (KY)
  - Goose Creek Prep (KY)
  - Gosling Branch (KY)
  - Martin Branch (KY)
  - Sly Branch (KY)
- Eagle Hawk/Laurel Creek (WV)
- Elkhorn Coal (KY)
- Energy Coal Partners
  - Alloy (SW)
  - Bent Mountain (KY)
  - Toney's Fork (SW)
- Fossil Fuels (KY)
- Golden Oak (KY)
- GTM Energy (AL)
- Hannah Energy
  - Cindas Creek (KY)
  - Moon Creek (KY)
  - Slater Branch-Pond Creek (KY)
  - Slater Branch-Cedar Grove (KY)
- Horizon (KY/WV)
- Ikerd Coal (KY)
  - Birdeye Hollow #1 (KY)
  - Flag Ridge (KY)
  - Little Round Mountain (KY)
  - Runyon Branch (KY)
  - Trace Branch (KY)
- Kentucky River Coal Company (KY)
- Logan Coal Partners/Madison Coal (WV)
- Miller Cove (VA)
- National Coal
  - Mann Steel Products (AL)
- Parkstone Energy
  - Chelyan Prep
  - Synergy (SW)
  - Essex (SW)
  - Miura #2 (SW)
  - Siata HWM (SW)
- Patriot
  - Jupiter (WV)
  - Panther (WV)
  - Remington (WV)
  - Rocklick (WV)
  - Wells (WV)
- Powell Mountain (VA)
- Progress Energy
  - Kelly Branch (KY)
- Quaker Coal (KY)
  - Beverly (KY)
  - Coal Prep (KY)
  - Road Creek (KY)
  - Sidewinder (KY)
- Sun Coal/Beechfork (KY)
- TECO
  - Premier Elkhorn (KY)
- Transco
  - Leeco (KY)